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ABSTRACT

This study sought to discover the extent to which organizational aspects of Individually Guided Education (IGE) schools relate to cognitive achievement of students in those schools. The theoretical framework was conceptualized with general and social systems theories that suggest relationships between inputs, processes, and outputs. The Instruction and Research (I&R) Unit of the IGE school was the unit of analysis. The theories suggested linkages between I&R unit effectiveness and student cognitive achievement in reading and mathematics. Effectiveness of the I&R unit was measured by the I&R Unit Operations Questionnaire whereby teachers report perceptions of how well their unit accomplishes the established performance objectives. Student achievement in reading and math was measured by a standardized test battery. Data were collected from 42 I&R units, selected at random from a national population of 959 schools in at least their third year of IGE implementation. In general, it was found that staff members perceived their I&R unit as being effective; the achievement levels of students in IGE schools in both reading and math compared favorably with national norms. Two basic null hypotheses were tested to determine interrelationships of I&R unit effectiveness and student cognitive achievement. The correlational statistics revealed that there was no significance between I&R unit effectiveness and student achievement in reading and math. Based upon the findings of this study, it is not possible to state empirically that there is any relationship between the effectiveness of the I&R unit and student achievement in that unit. Suggestions are offered for further, more definitive, research in this domain. A bibliography and an extensive set of appendixes is included. (MM)

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TECHNICAL REPORT NO. 385
(Part 1 of 2 Parts)

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JUNE 1976

WISCONSIN RESEARCH
AND DEVELOPMENT
CENTER FOR
COGNITIVE LEARNING

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Technical Report No. 385
Part 1 of 2 Parts

EFFECTIVENESS OF THE INSTRUCTION AND RESEARCH UNIT AND STUDENT ACHIEVEMENT IN IGE SCHOOLS

by

Conrad W. Sigurdson

Report from the Project on
Organization for Instruction and
Administrative Arrangements

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Faculty Associate

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

June 1976

This Technical Report is a doctoral dissertation reporting research supported by the Wisconsin Research and Development Center for Cognitive Learning. Since it has been approved by a University Examining Committee, it has not been reviewed by the Center. It is published by the Center as a record of some of the Center's activities and as a service to the student. The bound original is in the University of Wisconsin Memorial Library.

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WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

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The mission of the Wisconsin Research and Development Center for Cognitive Learning is to help learners develop as rapidly and effectively as possible their potential as human beings and as contributing members of society. The R&D Center is striving to fulfill this goal by

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- offering assistance to educators and citizens which will help transfer the outcomes of research and development into practice

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The activities of the Wisconsin R&D Center are organized around one unifying theme, Individually Guided Education.

FUNDING

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	vi
LIST OF FIGURES	viii
CHAPTER	
I. INTRODUCTION	1
Background of the Study	2
Theoretical Framework and Related Literature	8
I & R Unit Effectiveness	13
Statement of the Problem and Hypotheses	18
Significance of the Study	20
Limitations of the Study	21
II. DESIGN AND METHODOLOGY	22
Description of Study Instruments	22
I & R Unit Operations Questionnaire	22
Comprehensive Test of Basic Skills	26
Population and Sample Selection	30
Procedures for Data Collection	34
Statistical Techniques	34
Summary	36
III. ANALYSIS OF THE DATA	37
Correlational Tests of the Hypotheses	45
Multiple Regression Tests of the Hypotheses	66
IV. SUMMARY, FINDINGS CONCLUSIONS, AND IMPLICATIONS	80
Summary of the Study	80
Findings and Conclusions	86
Findings	86
Conclusions	91

IV. (continued) Page

Implications for Practice and Further Research 93

Implications for Practice. 94
Implications for Further Research. 95

BIBLIOGRAPHY 97

APPENDICES 102

APPENDIX A. 103

APPENDIX B. 111

APPENDIX C. 113

APPENDIX D. 118

APPENDIX E. 126

APPENDIX F. 134

APPENDIX G. 138

APPENDIX H. 140

LIST OF TABLES

TABLE		Page
1.	Reliability Levels for the I & R Unit Operations Questionnaire	25
2.	Numbers of Items and Time Limits by Skills Area and Tests for the CTBS/S, Level 2	28
3.	Z Score Calculation Based Upon Gross Unit Measures.	41
4.	Z Score Calculation Based Upon Mean Weighted Grade Data	42
5.	Z Score Calculation Based Upon Individual Student Data.	43
6.	Descriptive Statistics of Sample Distribution of Independent Variables	48
7.	Descriptive Statistics of Sample Distribution of Dependent Variables	49
8.	Correlations of the Independent Variables	51
9.	Correlations of the Dependent Variables	52
10.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=42)	53
11.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=9)	55
12.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=33).	56
13.	Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor 1 Item Scores (N=42)	58
14.	Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=42).	59

Table | Page

15. Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor I Item Scores (N=9) 60

16. Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=9) . . . 62

17. Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor 1 Item Scores (N=33). 63

18. Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=33). 64

19. Correlation Between I & R Unit Total Effectiveness and Total Reading (N=42). 65

20. Correlation Between I & R Unit Total Effectiveness and Total Mathematics 67

21. Regression Analysis With Dependent Variable of Reading Vocabulary. 70

22. Regression Analysis With Dependent Variable of Reading Comprehension 71

23. Regression Analysis With Dependent Variable of Total Reading 72

24. Regression Analysis With Dependent Variable of Math Computation 74

25. Regression Analysis With Dependent Variable of Math Concepts. 75

26. Regression Analysis With Dependent Variable of Math Applications. 77

27. Regression Analysis With Dependent Variable of Math Total . . 78

LIST OF FIGURES

FIGURE		Page
1.	Components of Individually Guided Education	3
2.	Multiunit Organization of an IGE School of 400-600 Students	5
3.	The School As a General System	9
4.	The Normative and Personal Dimensions of Social Behavior .	11
5.	The I & R Unit as a General and Social System.	12

EFFECTIVENESS OF THE INSTRUCTION AND RESEARCH UNIT AND STUDENT ACHIEVEMENT IN IGE SCHOOLS

Conrad Wilhelm Sigurdson

Under the supervision of Professor James M. Lipham

The purpose of this study was to ascertain the extent to which organizational aspects of Individually Guided Education schools relate to cognitive achievement of students in those schools. The theoretical framework for the study was conceptualized within general and social systems theories which suggest relationships between inputs, processes, and outputs. The Instruction and Research Unit of the IGE school was the unit of analysis. The theories suggested linkages between Instruction and Research unit effectiveness and student cognitive achievement in reading and mathematics. Effectiveness of the I & R unit was measured by the I & R Unit Operations Questionnaire whereby teachers report perceptions of how well their unit accomplishes the institutional expectations or specifically, the performance objectives set for their unit. Student Achievement in reading and mathematics was measured by a standardized test battery, the Comprehensive Tests of Basic Skills, Form S.

Data were collected from 42 I & R units, selected at random from a national population of 959 schools which were in at least their third year of IGE implementation. Unit mean scores were computed for the I & R Unit Operations Questionnaire and for the student achievement tests in reading and mathematics. In general staff members perceived their I & R unit as being effective. The achievement levels of students in IGE schools in both reading and

mathematics compared favorably with the National norms.

Computer programs were employed to obtain Pearson product-moment correlations and to solve multiple regression equations. These correlations and equations were used to test the hypotheses in the study.

Two basic null hypotheses were tested to determine interrelationships of I & R unit effectiveness and student cognitive achievement:

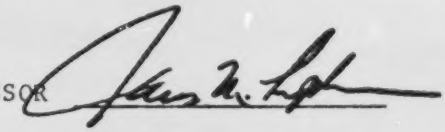
1. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total reading.
2. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

In addition to these two main hypotheses, subhypotheses relating to subscales the I & R Unit Operations Questionnaire and subscales of the reading and mathematics tests were tested.

The correlational statistics revealed that there was no statistical significance between I & R unit effectiveness and student achievement in reading and mathematics. The stepwise linear regression analysis indicated that the independent variables of I & R unit effectiveness accounted for a very small part of the variance in the dependent achievement variables of reading and mathematics.

Based upon the findings of this study, it is not possible to state empirically, that there is any relationship between the effectiveness of the I & R unit and student achievement in that unit.

Suggestions were offered for further definitive research in this domain.

MAJOR PROFESSOR 

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CHAPTER I

INTRODUCTION

Profound changes have taken place in public school education during the last quarter century. New concepts and procedures have emerged following new needs to be met, new knowledge about education, and new technologies to be utilized. In this time period, educators have developed innovative instructional programs and organizational structure in an attempt to meet society's changing demands. The seemingly immutable system of education which was established in the past century, grouping and teaching children in self-contained classrooms, has been increasingly rejected because of its inefficiency and ineffectiveness. Alternative learning systems continue to be devised to accelerate this change.

A major alternative form of education at the elementary level which has emerged on the American educational scene has been the introduction of Individually Guided Education (IGE), the organizational component of which is the multiunit school. The multiunit form of organization includes three hierarchical levels of operation: the Instruction and Research unit (I&R unit), the Instructional Improvement Committee (IIC), and the Systemwide Program Committee (SPC). This system of education, developed at the Wisconsin Research and Development Center for Cognitive Learning (R&D Center), was initially developed

in 1965. It is a comprehensive system of education and instruction and is designed to produce higher educational achievements by providing for individual differences in rate and style of learning. (Klausmeier, Quilling, and Sorenson, 1971, p. 1). The thrust of the present research is to investigate the extent to which the organizational aspects of IGE may relate to cognitive achievement of students in IGE schools.

Background of the Study

Individually guided education arose as a direct response to the need to improve education for American youth. Critics had long stressed that the age-graded, self-contained school was not responsive to the individual needs of children, the varied abilities and knowledge of teachers, the interests of the community, or to the results of scientific research concerning how children learn.

The IGE system consists of seven major elements or components. (Klausmeier, et al., 1971a, pp. 3-4). These elements, shown in Figure 1, include:

1. An organization for instruction and a related administrative organization
2. A model for instructional programming for the individual student
3. A model for developing measuring tools and evaluation procedures

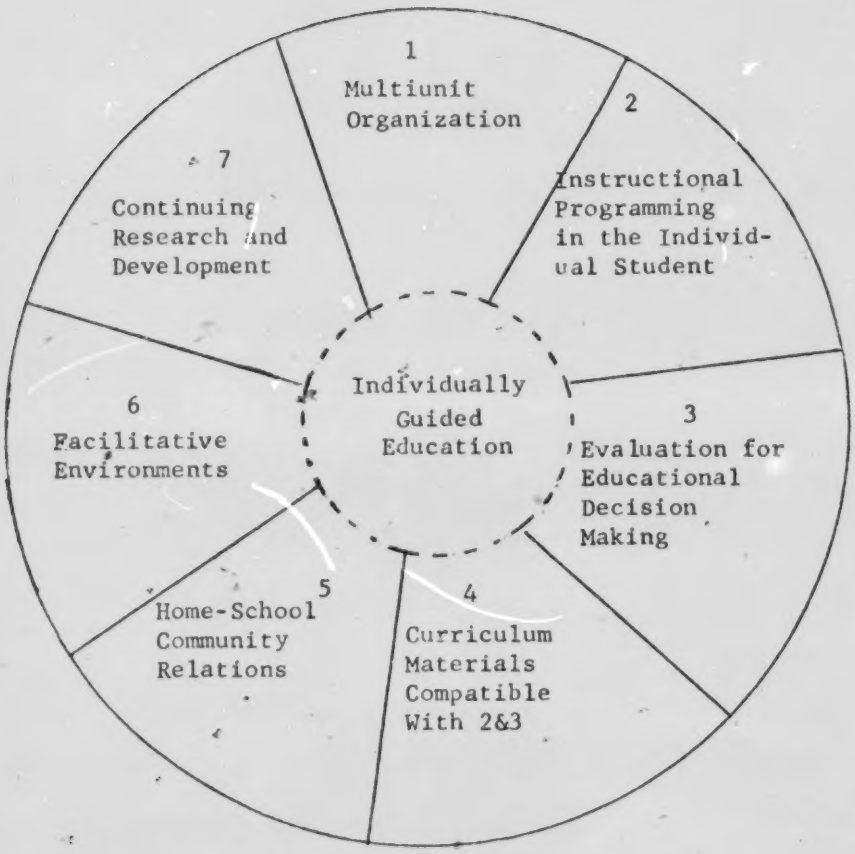


Figure 1. Components of individually guided education. From: James M. Lipham and Marvin J. Fruth, The Principal and Individually Guided Education (Reading, Mass.: Addison Wesley Publishing Co., 1976), p. 10.

4. Curriculum materials and related statements of educational objectives
5. A program of home-school-community relations
6. Intraorganizational and extraorganizational facilitative environments
7. Continuing research and development

Figure 2 depicts the organizational and administrative arrangement of the multiunit school elementary (MUS/E). The prototypic MUS/E organization consists of 400-600 students. The organizational hierarchy consists of interrelated groups at three distinct levels of operation: the instruction and research unit (I & R unit) at the student level, the instructional improvement committee (IIC) at the building level, and the systemwide program committee (SPC) at the district level. (Klausmeier, et al., 1971b, p. 20). The organizational plan utilizes differentiated staffing, team teaching, and shared decision making. The prototypic school of 400-600 students is divided into four separate units. Each I & R unit has a unit leader, 3-5 teachers, an instructional secretary, a teacher aide, and an intern. The principal function of each unit is to plan, implement and evaluate the instructional program for the unit.

The instructional programming model (IPM), utilized by the I & R unit, requires the stating of educational objectives for the unit, assessing the initial level of pupil achievement, setting specific individual educational objectives, appropriate grouping of students, planning and implementing the appropriate instructional sequence,

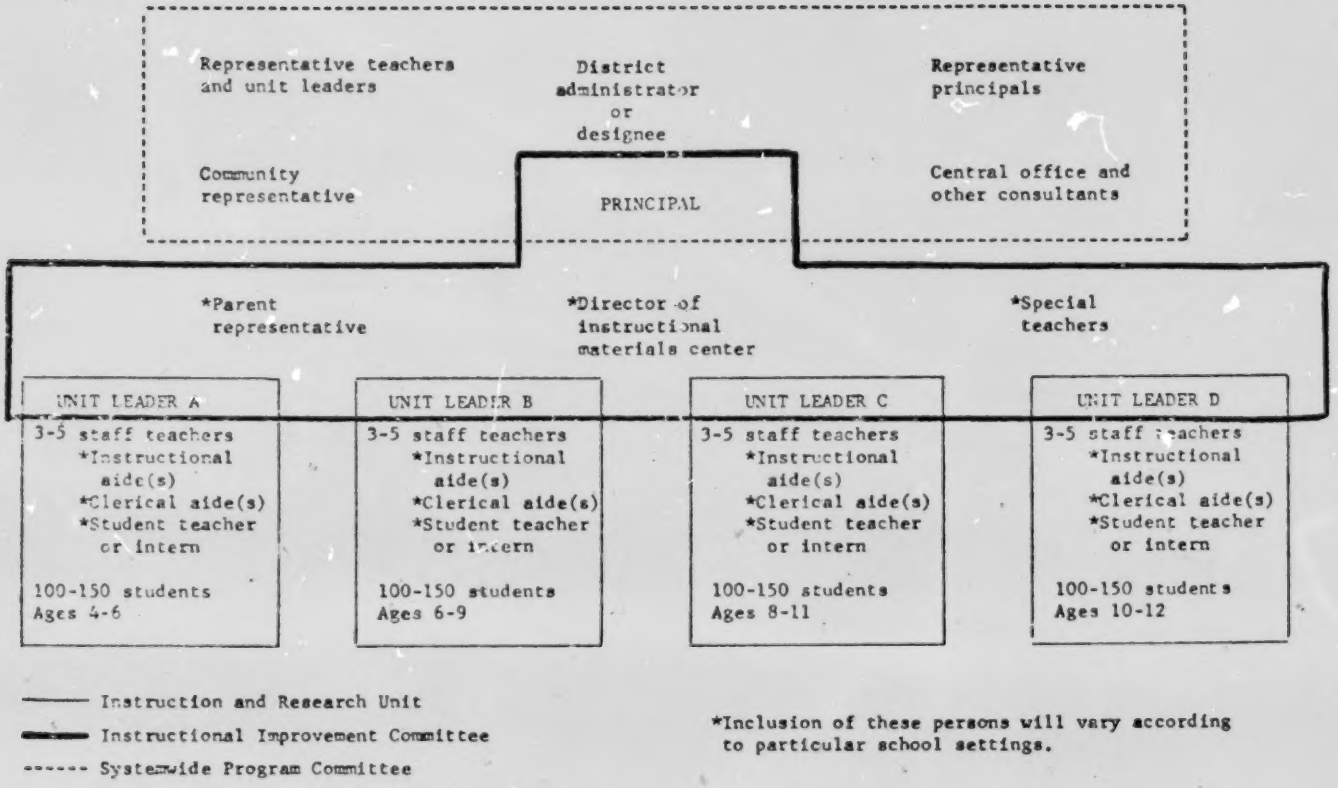


Figure 2. Multiunit organization of an IGE School of 400-600 students. (Adapted from: Herbert J. Klausmeier, Richard G. Morrow, and James E. Walter, Individually Guided Education in the Multiunit School, (Madison: Wisconsin Research and Development Center for Cognitive Learning, 1968).

post assessing and recycling the student within the IPM on the basis of determined needs. This plan requires teachers to work cooperatively; it encourages interpersonal interaction, open communication and shared decision making. A group of teachers, rather than an individual teacher, is responsible for the instruction of a large group of children. This group or unit of teachers and others is called the I&R unit.

At the building level, the principal and unit leaders constitute the Instructional Improvement Committee (IIC). This group often meets with other building personnel, such as the instructional materials center director, or with external consultants. The IIC, the coordinating body of the school, makes decisions on policies, objectives, and programs which affect all students and teachers within the school (Lipham and Fruth, 1976, p. 32).

At the school district level, the Systemwide Program committee (SPC) identifies resources and establishes policies which facilitate the maintenance and growth of the IGE schools. The SPC takes primary initiative in identifying the functions to be performed in the IGE schools in the system, recruits personnel for each school, and arranges for their inservice education, provides instructional materials, and disseminates relevant information within the system.

Performance objectives have been developed by personnel of the R&D Center for IGE schools. They have the broad intent of increasing student output. To attain this broad objective, I & R staffs must implement specific instructional programming practices, staff

development activities, operational procedures, and home-school-community strategies. Proponents of IGE expect that a school adopting this alternative system of education with central office support, will achieve its goals for the student as a direct result of utilizing all or most of the practices contained in the list of performance objectives. These objectives are listed in Individually Guided Education and the Multiunit School-Guidelines for Implementation (Klausmeier, Quilling, Sorenson, Way, & Glasrud, 1971, pp. 93-126). In a recent study (Evers, 1974), these performance objectives were utilized in the development of an instrument, the I & R Unit Operations Questionnaire, that provides a quantitative measure of the effectiveness of the I & R units. Effectiveness in that study was defined as goal achievement; that is, the degree or extent to which the performance objectives were achieved. If effectiveness is to be meaningful in IGE schools, however, it must also be related to other output measures such as student achievement.

Evaluation of elements of the MUS/E program has been carried out since its inception. Klausmeier, et al., reported (1971b, p. 15) that higher student achievement is occurring where the curriculum component in reading has been incorporated into functioning IGE schools and that IGE practices in early I & R units generally resulted in dramatic increases in student achievement over a short time interval. The present study seeks to investigate relationships between teaching effectiveness and student cognitive achievement.

Theoretical Framework and Related Literature

General system theory provides a conceptualization for examining linkages and relationships within the school environment. General systems has its roots in the scientific management approach to administration (Taylor, 1911), the human relations approach (Follett, 1941), and the behavioral science approach to administration (Barnard, 1964). There is no single, definitive, conclusive description of general systems theory. Lipham and Hoeh (1974, p. 30) stated that several definitions exist. Hall and Fagen (1956, p. 18) said: "a system is a set of objects together with relationships between the objects and between their attributes." Grinker (1956, p. 370) defined a system as "some whole form in structure or operation, concepts or function, composed of united or integrated parts," while Hearn (1958, p. 38) stated that it is possible to represent all forms of animate or inanimate matter as systems governed by certain constant principles discovered by scientists working in many fields whether biology, gestalt psychology, or systems analysis.

Systems have inputs, processes, outputs, and feedback mechanisms. When an educational institution is visualized as a general system, inputs include staff members, students, physical and financial resources, and outputs are transformed students and staff members. Figure 3 presents the school as a general system where inputs to the school, in the form of operands and operators, are transformed into outputs, which alter future system activity. The processes that

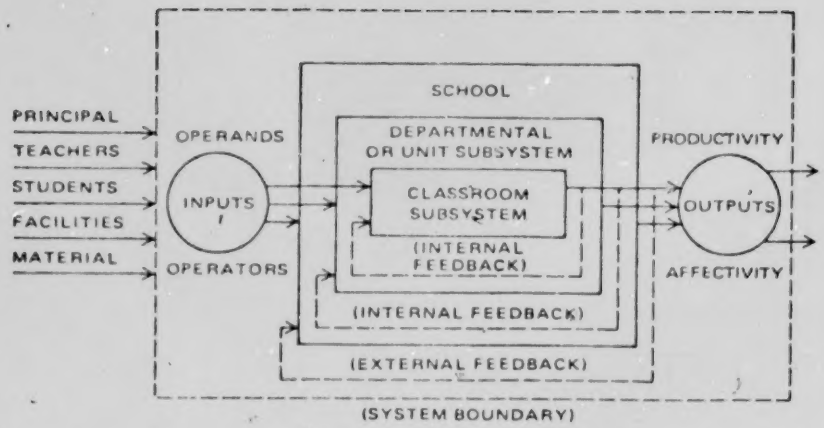


Figure 3. The school as a general system.
From: James M. Lipham and James A. Hoeh, The Principalship: Foundations and Functions (New York: Harper and Row, 1974, p. 34).

convert inputs into outputs bring into perspective another theoretical conceptualization, social systems theory. Education is a social process functioning within a network of interpersonal relationships, called a social system. There are three basic characteristics of such a system (Getzels, Lipham, and Campbell, 1968, p. 54). They are the interdependence of parts, their organization into some sort of whole, and the intrinsic presence of both individuals and institutions. Parsons' (1951, pp. 5-6) conceptualization stated:

> ...a social system consists in a plurality of individual actors interacting with each other in a situation which has at least a physical or environmental aspect, actors who are motivated in terms of a tendency to the optimization of gratification and whose relation to their situations, including each other, is defined and mediated in terms of a system of culturally structured and shared symbols.

The social system involves two classes of phenomena which are conceptually independent, but phenomenally interactive. The first class of phenomena is the institutions with certain roles and expectations that will fulfill the goals of the system. The second class is the group of individuals with certain personalities and need-dispositions, inhabiting the system, whose interactions comprise social behavior (Getzels, et al. 1968, p. 56). The behavior may be understood as a function of the institution, roles, and expectations which constitute the normative, nomothetic, or sociological dimension of behavior, and the individual, personality and need-disposition, which together constitute the personal, idiographic, or psychological dimension of behavior within the social system. Figure 4 depicts these interactive dimensions. The normative dimension appears at the top of the diagram and consists of the institution, role, and expectation. The personal dimension appears at the bottom of the diagram and consists of the individual, personality, and need-disposition. In each dimension, each term serves as the analytic unit for the term preceding it (Lipham and Hoeh, 1974, p. 53). Social behavior results from the interaction of these dimensions. That is, behavior in a social system is a function of the interaction between a given institutional role, defined by the expectations attaching to it, and the personality of a particular role incumbent, defined by one's own need-dispositions.

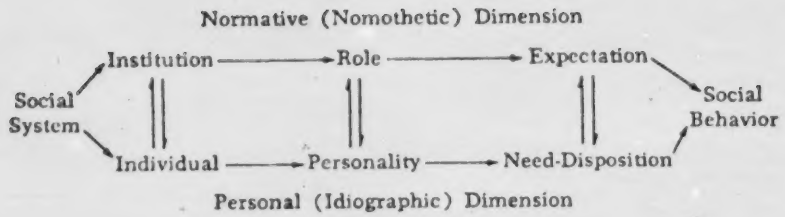


Figure 4. The normative and personal dimensions of social behavior (Adapted from J. W. Getzels and E. G. Guba, "Social Behavior and the Administrative Process," School Review, 65, (1957), p. 429.

The social system, which essentially describes a process, is embedded within the all-encompassing general system with its inputs and outputs. Figure 5 demonstrates the interactive nature of general systems and social system theories. The network of interpersonal relationships which constitutes the social system and its processes for this study is the school I&R unit. The inputs are the students, staff, and physical and financial resources. The outputs are the transformed students and staff members. The normative dimension of the "processes" component of this general systems model comprises the I&R unit with its constituent roles and corresponding expectations. The expectations, for the purposes of this study, are the performance objectives of the I&R unit, measured by the I&R Operations Questionnaire alluded to earlier. The personal dimension in this model is composed of staff members and students of the I&R unit with their personalities and need dispositions. The resulting social behavior has an impact on the outputs of the system. The institutional outputs

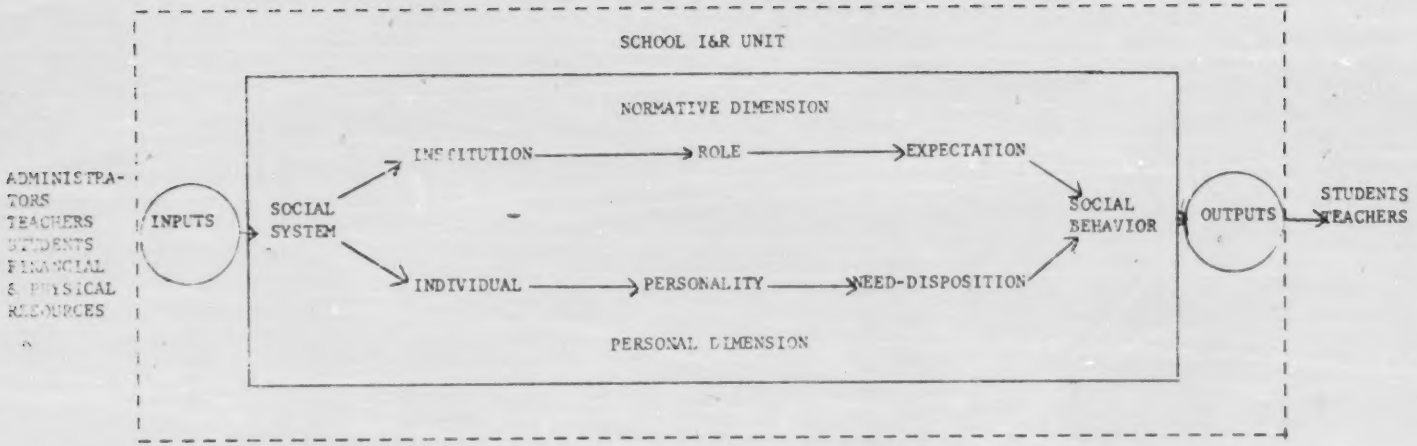


Figure 5. The I&R Unit as a general and social system.

being considered in this research study are cognitive achievements. Academic achievement is but one of the many outputs in this system. Schooling is expected to produce many others, such as affective change, retention rates, proportion of students going to college, income and occupation of graduates, and teacher change and development--to mention only a few.

I & R Unit Effectiveness

The present research has theorized relationships or linkages between the I & R unit effectiveness and student cognitive achievement in reading and mathematics. Effectiveness in terms of social systems theory, is defined as the "accomplishment of the cooperative purpose which is social and non-personal in character (Lipham and Hoeh, 1974, p. 62). In terms of the I & R unit, effectiveness is measured by the I & R Unit Operations Questionnaire which reports teachers' perceptions of how well each one believes they accomplish the institutional expectations, or more specifically, the performance objectives set for their unit. If organizational effectiveness is to be meaningful however, it must have some impact on organizational outcomes, in this case, student achievement. McNeil and Popham reported (1973, p. 18) that a focus on pupils reveals far more about the effectiveness of teachers than does direct study of the teachers themselves. The relationship between teaching effectiveness and impact upon the learner has been studied by many research organizations and individual researchers (American Educational Research Association,

1952; Astin and Lee, 1966; Biddle and Ellena, 1964). A study on teacher influence, pupil attitude, and achievement (Flanders, 1964, p. 213) revealed that student achievement was significantly higher in classes that had "indirect" teachers. These were teachers who allowed a greater student participation and class interaction. In terms of the theoretical model, the implication is that it is the particular teacher input that accounted for increased academic achievement and not the other inputs of the system.

The Equality of Educational Opportunity Report (1966, Table 3.24.1) minimized the effect of instructional expenditure input:

> ...after controlling six student background variables, district per pupil instructional expenditure for grades 6, 9, and 12 accounted for 0.09 percent of the variance in educational achievement of negro students in the north, and 0.29 percent for white northeners.

Mosteller and Moynihan, commenting on the Coleman report, (1972, p. 15) stated that the path breaking quality of the EEOR had to do with its analysis of the relation in variation of school facilities to variation in levels of academic achievement. It reported so little relation as to make it almost possible to say that there was none. The EEOR (1966, p. 312) further elaborated: "Some facilities measures, such as pupil/teacher ratio in instruction are not included (in a report) because they showed a consistent lack of relation to achievement among all groups under all conditions." The importance of the family and its socioeconomic status to achievement has been well documented in previous research. Coleman (Mosteller and Moynihan, 1972, p. 19) referring to this issue stated:

> ...First within each racial group, the strong relation of family economic and educational background to achievement does not diminish over the period of school and may even increase over the elementary years. Second most of the variation in student achievement lies within the same school, very little of it is between schools.

The present study tended to minimize within school variation by employing mean unit scores. Coleman further stated (Mosteller and Moynihan, 1974, p. 20):

> ...the school-to-school variation in achievement, though relatively small, is itself almost wholly due to the social environment of the school.

The contention in this study is that the non-human resources may have limited effect on achievement. Since IGE provides a new, open, social environment within the school, this new form of schooling should stimulate student academic achievement.

In a study of student achievement and attitudes in Janesville, Wisconsin, (Morrow, Quilling, Fox, 1969) pupils equivalent to grades 1, 3, and 5 were compared with pupils in non-IGE schools. Achievement of students equivalent to grades 1 and 3 was analyzed in one IGE school while achievement of students equivalent to grade 5 was analyzed in a second school. Nationally normed cognitive tests were used to measure achievement. The findings were that no significant differences in student achievement existed between the multiunit schools and the control schools. Although differences did appear in specific subject matters at specific grade levels, the total pattern of growth in achievement did not differ substantially. However, the authors stated that the testing program actually took place in the IGE schools

during the transition stage from the traditional, self contained school organization to the multiunit organization. The conclusion warranted is that the IGE students apparently did not lose ground in achievement during the transitional year. The authors suggested that significant achievement gains by students are likely to come after the first and perhaps the second year of multiunit operation.

In a later two-year study (Quilling and Sorenson, 1975), achievement in reading and mathematics in an IGE school in Racine, Wisconsin, was compared with achievement of pupils in a conventionally organized control school. Once again, standardized achievement tests were used as a measurement of achievement. This study was conducted during the first two years following the implementation of IGE. Mixed results were obtained. During the second year of the field test, there was some evidence that nontransient IGE pupils made more progress than the comparable group in the control school. Statistically significant results were not observed. Although this was essentially a two-year study, a follow-up analysis was made on student achievement as measured by standardized achievement tests in both schools in the third year. Substantial improvements were observed in the achievements of IGE pupils. The authors concluded that the multiunit school can fulfill the promise of higher achievement for pupils, but that this may not occur as early as was expected.

Both of the above IGE studies measure student output in experimental and control schools by utilizing standardized achievement

measures. The researchers simply asked whether achievement of students in the multiunit school organization differed significantly from achievement of students in non-IGE schools. They did not suggest which factors within a school organization might contribute to student achievement.

Instead of merely determining student achievement as measured by standardized achievement tests, evaluation might focus its efforts on determiners or factors associated with various outcomes as was suggested in The Teacher College Record (Cronbach, 1963) so that instructional procedures and organizational conditions could be modified, thereby maximizing outcomes.

In a study examining determinants of organizational effectiveness of school districts in Colorado (Bidwell and Kasarda, 1975), it was discovered that high pupil-teacher ratio and high administrative intensity depressed median levels of achievement in reading and mathematics. High staff qualifications had a positive relationship on the reading achievement while the relationship of staff qualifications to mathematics achievement was not statistically significant.

It has been reported that higher student achievement is occurring where the curriculum component in reading has been incorporated into smooth functioning multiunit elementary schools and that IGE practices in early I&R units generally resulted in dramatic increases in student achievement over a short time interval (Klausmeier, et al., 1971, p. 15). If, as has been suggested, students in IGE schools do make greater gains in achievement than do students in traditional schools,

there must be factors within the multiunit organization itself that determine organizational effectiveness; there must be specific factors responsible for higher achievement. The purpose of this research was to determine the extent to which significant relationships existed between the "effectiveness" of the I & R unit of multiunit IGE schools and student achievement in those schools. The extent to which "effective" teaching units and high output of students are highly correlated would have important implications for the I & R unit and would be a guide for further development and refinement of IGE.

Statement of the Problem and Hypotheses

This study was designed to investigate the relationship between the effectiveness of I & R units in IGE schools and student output. Staff effectiveness was measured by the I & R Unit Operations Questionnaire, and student output was measured by achievement scores in reading and mathematics.

The basic hypotheses in the study were:

1. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in student achievement in total reading.
2. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

The I & R Unit Operations Questionnaire has six subscales; the standardized reading test has three subscales; and the mathematics test has four subscales. These subscales are:

I & R Unit Operations Questionnaire:

(a) Instructional program (reading)
(b) Instructional program (mathematics)
(c) Organizational operations (procedural)
(d) Organizational operations (substantive)
(e) Home-school-community relations
(f) Staff development

Standardized Reading Test

(a) Vocabulary
(b) Comprehension
(c) Total reading

Standardized Mathematics Test

(a) Computation
(b) Concepts
(c) Applications
(d) Total mathematics

Subhypotheses were stated concerning relationships between the independent subscales and the dependent subscales. These subhypotheses were:

1. There is no significant relationship between unit mean scores in instructional program (reading) effectiveness and:

   (a) Vocabulary unit mean scores
   (b) Comprehension unit mean scores
   (c) Total reading unit mean scores

2. There is no significant relationship between unit mean scores in instructional program (mathematics) effectiveness and:

   (a) Computation unit mean scores
   (b) Concepts unit mean scores
   (c) Applications unit mean scores
   (d) Total mathematics unit mean scores

3. There is no significant relationship between unit mean scores in I & R unit organizational operations (procedural) effectiveness and:

   (a) Reading vocabulary unit mean scores
   (b) Reading comprehension unit mean scores

3. (continued)

   (c) Total reading unit mean scores
   (d) Mathematics computation unit mean scores
   (e) Mathematics concepts unit mean scores
   (f) Mathematics applications unit mean scores
   (g) Total mathematics unit mean scores

4. There is no significant relationship between unit mean scores of I & R unit organizational operations (substantive) effectiveness and:

   (a) Reading vocabulary unit mean scores
   (b) Reading comprehension unit mean scores
   (c) Total reading unit mean scores
   (d) Mathematics computation unit mean scores
   (e) Mathematics concepts unit mean scores
   (f) Mathematics applications unit mean scores
   (g) Total mathematics unit mean scores

5. There is no significant relationship between unit mean scores of I & R unit home-school-community relations effectiveness and:

   (a) Reading vocabulary unit mean scores
   (b) Reading comprehension unit mean scores
   (c) Total reading mean unit scores
   (d) Mathematics computation unit mean scores
   (e) Mathematics concepts unit mean scores
   (f) Mathematics applications unit mean scores
   (g) Total mathematics unit mean scores

Significance of the Study

This study has significance in that it investigates the relationships between organizational effectiveness of the school and student achievement. A review of the literature revealed that although there has been considerable research on student achievement and individual teacher effectiveness, there has been little research relating student achievement to the effectiveness of the teaching group. Results of this research will be of value to staffs of IGE schools as they continue to refine and develop their programs. Conclusions drawn

from this study can have important implications for the further development and refinement of the MUS/E organization. In conclusion, this study has significance in that it provides empirical support for the theoretical model presented in this study which implies a relationship between expectations of the institution and the outputs of the system.

Limitations of the Study

Whenever an empirical study is conducted, extraneous variables may have deleterious effects on the data. For example, have all students had the same opportunity to study the topics that were measured in the standardized achievement tests? Were the teachers equally perceptive and honest in their appraisal of the effectiveness of their units?

The measures of student output in this study were achievement scores in the curricular fields of reading and mathematics. No generalizations can be made to other cognitive areas; nor may generalization be made to the affective or psychomotor domains. The results of this study may be generalized only to the intermediate units that have introduced the instructional programming model in the curricular areas of reading and mathematics.

Correlational research simply determines only whether or not a relationship exists; it does not indicate that relationships are causal (Lehmann and Mehrens, 1971, p. 190). On the other hand, if a high correlation occurs, the credibility of the hypotheses is strengthened, in that it has survived a chance of disconfirmation. (Campbell and Stanley, 1963, p. 64).

CHAPTER II

DESIGN AND METHODOLOGY

This chapter delineates the design and methodology of the study. These are four sections in the chapter which describe: (a) the study instruments, (b) the population and sample selection, (c) the data collection procedures, and (d) the statistical techniques employed for data analysis.

Description of Study Instruments

Chapter I described the hypothesized relationships between teaching effectiveness and student output. More specifically, relationships between the effectiveness of the I & R unit staff and student cognitive achievement were posited. The I & R Unit Operations Questionnaire was employed to measure staff effectiveness (Appendix A). The mathematics and reading sections of the Comprehensive Tests of Basic Skills (California Test Bureau, 1974) were employed to measure student cognitive output (Appendix B).

I and R Unit Operations Questionnaire

The I and R Unit Operations Questionnaire (Evers, 1974) provided the data to determine the quantitative measure of I & R unit staff effectiveness, the independent variable. This instrument consists of

fifty-one items which were developed from a list of performance objectives identified as the responsibility of the I & R unit (Klausmeier, Quilling, Sorenson, Way, and Glasrud, 1971, pp. 91-126). The fifty-one items were separated into four categories. They are: (1) Instructional Program, (2) Staff Development, (3) Organizational Operations, (4) School-Community Relations (Evers, 1974, p. 44). The instrument has a five point, Likert-type response rating scale ranging from very effectively to very ineffectively. The teachers and unit leader of each I & R unit rated independently the degree to which they perceived their unit achieved each of the performance objectives.

The content validity of the questionnaire was established by having a six-member jury, consisting of IGE researchers, practitioners, and evaluators judge the questionnaire in terms of clarity, content, item construction, and the correspondence of items to the performance objectives for I & R units (Evers, 1974, p. 45).

Evers employed PROGRAM TSTAT (Spuck, 1971), a University of Wisconsin computer program, to calculate alpha coefficients for an assessment of reliability of the I & R Unit Operations Questionnaire. This instrument was modified slightly for the present study in that the teachers were requested to respond to the 18 items of the first scale, Instructional Program, in a different way from that employed in the previous study. In the Evers study, this scale was not related to a specific curricular area. The present study was concerned with the relationships between staff effectiveness and student

achievement in reading and mathematics. Therefore the teachers were requested to respond to the items in the scale, first with regard to procedures they employ when they teach reading, and then with regard to procedures they employ when they teach mathematics. Each items in this scale was answered twice. It was considered therefore, that there were two scales on Instructional Program: Instructional Program-Reading and Instructional Program-Mathematics. Because of this slight change in the use of this instrument, it was considered necessary to recalculate its reliability. The levels of internal consistency for each of the scales and for the total 51 items derived from both studies by using PROGRAM TSTAT (Spuck, 1971) are presented in Table 1. The reliabilities calculated in the present study are quite consistent with those determined originally.

A factor analysis of the 51 items was performed by Evers. Factor analysis is a method for determining the number and nature of the underlying variables among a larger number of measures. It relates, in effect, what tests or measures cluster together (Kerlinger, 1973, p. 659). In the case of the I & R Unit Operations Questionnaire, factor analysis was utilized to determine which questions belonged together. It was used to determine whether the categories of Instructional Program, Organizational Operations, Staff Development, and School-Community Relations were, in fact appropriate constructs for the 51 items in the questionnaire or whether these items should be categorized into other factors or constructs. PROGRAM BIGFACT

TABLE 1

RELIABILITY LEVELS FOR THE I & R UNIT OPERATIONS QUESTIONNAIRE

Category	Evers Study N=673	Present Study N=178
Instructional Program	.9329	---
Instructional Program-Reading	---	.9233
Instructional Program-Mathematics	---	.9357
Staff Development	.8209	.8255
Organizational Operations	.9283	.9105
School-Community Relations	.7885	.8026
Total	.9589	.9634

(Spuck, McIsaac and Berg, 1972) was the computer program that Evers used to perform the factor analysis on the mean item scores of the 163 I & R units in her study (Evers, 1974, p. 61). This computer program utilizes "principal component analysis" to determine the common factors (Spuck, McIsaac, Berg, 1972). This method is mathematically sound because it yields a unique solution of a factor problem. A major feature of this method is that it extracts a maximum amount of variance as each factor is calculated. That is, the first factor extracts the most variance, the second the next most, and so on (Kerlinger, 1973, p. 667). From the subsequent factor analysis, six factors were determined from the four categories. They were labelled:

1) I and R Unit Instructional Program (I)
2) I and R Unit Organizational Operations (procedural)
3) I and R Unit School-Community Relations
4) I and R Unit Organizational Operations (substantive)
5) I and R Unit Staff Development
6) I and R Unit Instructional Program (II) (Evers, 1974, p. 73)

Generally the concepts presented in the performance objectives and categorized in the questionnaire were validated with two exceptions. The items from the Instructional Program category were subdivided into two factors for which Evers delineated no conceptual difference. The organizational operations category was also subdivided into two factors: procedural and substantive.

The 51 items, categorized into their six appropriate factors are listed in Appendix C. Based upon the results of this factor analysis, Evers determined to use eight scales in the testing of her hypotheses. These were:

1. I and R Unit Total Effectiveness
2. I and R Unit Instructional Program (I & II) Effectiveness
3. I and R Unit Instructional Program (I) Effectiveness
4. I and R Unit Instructional Program (II) Effectiveness
5. I and R Unit Organizational Operations (Procedural) Effectiveness
6. I and R Unit Organizational Operations (Substantive) Effectiveness
7. I and R Unit School-Community Relations Effectiveness
8. I and R Unit Staff Development Effectiveness (Evers, 1974, p. 73)

The present research employed the instructional program scale intact and the organizational operations scale was divided into two scales based on the factor analysis for the basic testing of the hypotheses.

Comprehensive Test of Basic Skills

The Comprehensive Test of Basic Skills, Expanded Edition (CTB/McGraw Hill, 1974) is a series of batteries for kindergarten through

grade 12. The batteries comprise seven overlapping levels. The level and grade designation are below: (CTB/McGraw Hill 1974b, p. 7).

Level A	Grades K.0 - 1.3
Level B	Grades K.6 - 1.9
Level C	Grades 1.6 - 2.9
Level 1	Grades 2.5 - 4.9
Level 2	Grades 4.5 - 6.9
Level 3	Grades 6.5 - 8.9
Level 4	Grades 8.5 - 12.9

The batteries in levels 1 through 4 contain seven tests in three basic skill areas: Reading, Language and Mathematics. This study used the Reading and Mathematics sections of the level 2 battery. The grade designations for level 2 are 4.5-6.9. Since the testing was done in the latter half of the school year, level 2 was considered appropriate for all students in the selected intermediate units. In any case, studies conducted by CTB/McGraw Hill have shown high correlation between levels of the tests when students in grades where 2 levels overlap were administered both levels within an interval of two to four weeks (CTB/McGraw Hill 1974c, p. 42).

The number of items and time limits for each subtest in reading and mathematics are listed in Table 2.

The standardization of CTBS/S was designed to provide national and large city norms, based upon a probability sample of the entire national school population. The sample, drawn from both public and Catholic schools within the 50 states, was comprised of approximately 150,000 students in grades K through 12 (CTB/McGraw Hill 1974b, p. 59). The

TABLE 2

NUMBER OF ITEMS AND TIME LIMITS BY SKILLS AREA AND TEST FOR CTBS/S, LEVEL 2*

Skills Area Test	Number of Items	Number of Minutes
Reading		
Vocabulary	40	14
Comprehension	45	35
Mathematics		
Computation	48	40
Concepts	25	35
Applications	25	

Note: Although mathematics concepts and applications are administered as one test, separate scores are reported for them.

tests were administered to this sample in 1972 and 1973. The sampling unit for the first stage sampling was the school district; for the second stage sampling, the unit chosen was the school. To obtain a representative sample for the national norming and to reduce variability, the population of public school districts was stratified to geographic region, average enrollment per grade, and community type.

It can be assumed that racial or ethnic minority groups are represented in the national norms. The sampling technique provided for proportionate sampling of minority groups, CTB/McGraw Hill conducted research and attempted to identify and eliminate racial, cultural, and ethnic bias during the development and standardization of the tests. Members of minority groups knowledgeable about how students learn and perform in test situations reviewed the test for

content bias (CTB/McGraw Hill 1974b, p. 14).

CTBS, Expanded Edition, represents a revision and expansion of CTBS, forms Q and R, which were published in 1968 and 1969. New items reflecting current trends in the curriculum were added. These tests are not intended to measure achievement in specific course content as reflected in textbooks for various grade levels. The tests, according to the publisher, are intended for national use by students who have been taught by various approaches.

The process classification of items for CTBS follows essentially the approach presented in The Taxonomy of Educational Objectives (Bloom, ed., 1967) and the content-cognitive behavior levels framework employed in the National Longitudinal Study of Mathematical Abilities (Wilson, Cohen and Begle, 1971, p. 10). The objectives of the tests are classified under five broad intellectual processes: recognition, translation, interpretation, application, and analysis. The emphasis in the process dimension is on the measurement of comprehension and application of concepts and principles rather than on the measure of knowledge per se. Within each broad classification, categories are expressed in terms of intellectual activities and the content in which the specific intellectual activity is measured. The process classification and content categories of levels one through four are explained in detail in The Coordinator's Handbook, 1974, pp. 32-36 and 42-46.

Reliability Coefficients for each level tested were determined in the standardization of CTB/S by use of the Kuder-Richardson Formula 20 and ranges for total reading and total mathematics, between .94 and .97 (CTB/McGraw Hill 1974c, p. 41).

Although the final evaluation of validity of the test must be based on a school's own objectives and curriculum, it may be said

that the emphasis in these tests is on the measurement of the grasp of broad concepts and abstractions, as developed by all curricula. The scheme, according to the publisher, is so arranged that there is an inherent hierarchy of skills and levels of thinking consistent with what is currently known about child development, cognitive structure, and learning process.

A special feature of this series of tests is the Expanded Standard Scores (Scale Scores). These are produced from a single, equal interval scale of scores across all grades for use with all levels of CTBS/S. The expanded standard score is expressed in a three-digit number, ranging from 000 to 999. The scale scores are useful for plotting trends in achievement for school systems. Comparisons may be made between the group tested and the standardization sample. The development of this scale utilizes raw scores, Z scores, and grade/time of testing (CTB/McGraw Hill 1974c, p. 12). Scores can be added, subtracted and averaged regardless of level administered. Because the difference between any two successive scores on the scale is the same, differences can be quantified.

Population and Sample Selection

The 1973-74 IGE Multiunit School Directory, published by the Wisconsin Research and Development Center for Cognitive Learning, identified elementary schools in the United States that have been organized and staffed according to the multiunit pattern (MUS/E). The use of this particular directory for determining the population of

the study meant that all schools in the selected sample would have been in their third year of IGE at a minimum. Many of the 959 schools listed in the directory would have been following this pattern for a longer period of time. Each school is unique, however, and utilizes IGE procedures and principles in a way it finds suitable to its own circumstances and needs. Minimal criteria for participation had to be set so that all schools in the study were basically comparable. Personnel in the Wisconsin Research and Development Center for Cognitive Learning have defined minimal criteria for schools that may be labelled IGE (Evers, Fruth, Heffernan, Karges, Krupa, 1975). The criteria are listed below:

1. The entire school is organized in the MUS-E organization pattern with:
   A. Instruction and Research Units (I & R Units)
      Each I & R Unit has:
         approximately 75 to 150 students of multiages
         approximately 4 to 6 teachers
         one unit leader

      The unit leader and teachers of the I & R Unit meet at designated, regular times each week.

   B. An Instructional Improvement Committee (IIC)
      The IIC is composed of:
         the principal
         the unit leaders from each I & R Unit in the building
         the IMC director

      The IIC meets at a designated time each week (p. A-26)

2. The school applies the Instructional Programming Model (IPM) in one or more curricular area(s) by:
   A. stating schoolwide educational objectives to be attained by the students in the building for the curricular areas to which the IPM has been applied.
   B. estimating the range of educational objectives that may be attained by students in each I & R Unit for the curricular areas to which the IPM has been applied.

2. (continued)

C. assessing individual student's level of achievement, learning style, and motivation level using criterion-referenced tests, observation, or work samples for the curricular areas to which the IPM has been applied.
D. setting instructional objectives for each individual student to attain over a short period of time for the curricular areas to which the IPM has been applied.
E. planning and implementing an instructional program for each individual student for the curricular areas to which the IPM has been applied.
F. assessing students for attainment of the stated instructional objectives for the curricular areas to which the IPM has been applied.
G. if the student has attained the objective(s) to mastery, setting the next instructional objective for the student; if the student has not attained the objective(s) to mastery, reassessing the student, and going through the instructional sequence again or engaging in some other activity. (p. A-27)

These criteria were considered minimal for the study. In addition, personnel from the Wisconsin Research and Development Center for Cognitive Learning and from the Educational Administration Department of the University of Wisconsin determined additional criteria for IGE schools who participated in this and three companion studies (Bocian, Feldman, and Mendenhall). The companion studies, relating to student affective behavior, staff decision involvement, job satisfaction, and organizational structure required the identical school population. The additional criteria for the four studies were:

1. The I & R units must have implemented the instructional programming model in reading for at least two complete years and in mathematics for at least one complete year.

2. The school must have an active IIC which meets at least twice a month.

3. A final criterion was that the I & R unit staff had to agree to participate.

The defined population for this study was all intermediate units in the 959 IGE schools which met the above criteria. A stratified random sampling procedure was employed to select these schools. The stratification was on the basis of "city" and "other." "City" was defined as an incorporated urban area having a population equal to or greater than 200,000 people, according to the 1970 census, while "other" was defined as having a population under 200,000 inhabitants. The reason for this stratification was to ensure a city representation. Approximately 20 percent of the schools were located in "city" areas. Forty-two schools were selected from this population. Nine schools were in the city category and thirty-three were in the "other." A computer program (APL, 1972) was employed to generate the random samples. Since all schools in the directory did not meet the criteria for the study, the two populations of IGE schools were placed in a random order and telephone calls were made to the schools to determine their admissibility into the project, based upon the criteria for the study, and to seek their cooperation and participation (Appendix D). An intermediate unit within each chosen school was selected randomly by the Computer Program IRANDX (Spuck and McIsaac, 1971). Within the selected unit, one-third of the students was selected randomly (APL, 1972) for the reading achievement test, one-third was selected for the mathematics achievement test, and the final one-third of the students in the unit participated in a self-concept test for one of the companion studies (Bocian).

Procedures for Data Collection

General information concerning the project which included the present study and the three companion studies were sent to the principals of the schools that agreed to participate. This information R-3 Research Project-General Information (Appendix E), included a brief background of the studies, a description of the instruments, research procedures, and the purpose of the research. This information was followed by Procedural Details (Appendix E). The Procedural Details letter requested student information from the school. This information enabled the researchers to place the students randomly into the three testing groups, and enabled the researchers to place student data on the test response sheets before going to the schools. This letter also described the research procedures that would be used when the researchers would arrive at the school to collect the data. Teacher instruments were sent to the schools approximately two weeks prior to the researcher's visit. Teachers were expected to have these completed before the day of testing. On the day that the researcher arrived, he/she met with the I & R unit staff, collected the teacher instruments from them and discussed the student testing procedures with them. (Appendix E has the meeting agenda). He/she then directed and helped with the student testing program.

Statistical Techniques

The effectiveness of the I & R teaching unit was measured with the I & R Unit Operations Questionnaire. Student achievement in

reading and mathematics was measured by the reading and mathematics tests of the Comprehensive Tests of Basic Skills (CTB/McGraw Hill, 1974). Since the unit of analysis in the study was the I & R Unit, mean unit scores were calculated on both the I & R Unit Operations Questionnaire and on the student achievement tests in each unit.

The basic research hypotheses suggest relationships between I & R unit effectiveness and student achievement in mathematics and reading. These hypotheses were tested using Pearson Product Moment Coefficients of Correlation. This analysis was achieved with the aid of PROGRAM WISE*STAT.DISTX, a University of Wisconsin computer program (Spuck, Stofflet, and Fleckenstein, 1971). A bivariate approach (one independent and one dependent variable) although giving a global picture of relationships was not considered an adequate analysis for such a study. It was possible that some of the scales, in combination were more closely related to student achievement than individual scales. A multivariate approach was necessary. Multiple linear regression analysis is a method of analyzing the contributions of two or more independent variables to one dependent variable. The combined and separate effects of I & R unit effectiveness were analyzed with student achievement in mathematics and its subscales and with reading and its subscales. The several scales of the effectiveness measure are the independent or predictor variables while the achievement scales, taken separately, are the criterion or dependent variables. The analysis, a stepwise multiple linear regression analysis, was performed through the use of PROGRAM WISE*LIB. SETSTP,

a University of Wisconsin computer program (Stofflet and Spuck, 1971) for multiple regression analysis. There are two basic approaches to stepwise selection procedures: "forward" and "backward". The procedure used in this study was the "forward" method. This selection procedure began by choosing the independent variable which has the highest correlation with the dependent variable. The regression model, using this one independent variable is then determined. The next independent variable chosen is that one whose partial correlation, given the variable already in the equation, with the dependent variable is the highest. This variable is then added to the regression model and a new solution is calculated. This procedure continues until all independent variables have been included in the model (Stofflet and Spuck, 1971).

Summary

This chapter contained a description of the design and methodology employed in the study. The instruments were described. The methods used in determining sample definition, selection procedures, data collection, and statistical procedures were then reported. Chapter III contains a discussion of the data treatment and analysis.

CHAPTER III

ANALYSIS OF THE DATA

This chapter consists of three sections. The first describes the derivation of the student achievement scores. The next presents the results of the correlations used to test the hypothesized relationships of I & R unit effectiveness to student achievement in reading and mathematics. The final section presents the results of the multiple regression analysis.

Derivation of Student Achievement Scores

The California Test Bureau corrected the achievement tests used in this study. As described in Chapter II, the California Test Bureau provides an expanded standard score system (scale scores) for users of the Comprehensive Test of Basic Skills, Form S (CTBS/S). These scale scores are produced from a single, equal interval scale of scores across all grades for use with all levels of this test battery. The expanded standard Score scale is expressed in three-digit numbers, ranging from 000 to 999. The term "Expanded Standard Score" is used to indicate that the scale can be transformed linearly into ordinary normalized standard scores at any grade point within a level. Scale scores are available for each test in the battery, for each skill area, and for the total battery. These scale scores enable the user

to chart a student's growth from the beginning of school through grade 12, regardless of which levels of CTBS/S have been administered. These scores are also useful for plotting trends and growth in achievement for school systems. Comparisons may be made between the group tested and the standardization sample (Examiner's Manual, 1973, p. 41). There is a distinctive difference between scale scores and raw scores. Raw scores are equal interval in that they indicate the number of items correct, but since some items are more difficult than others, the difference in achievement between a raw score of 1 and a raw score of 2 is smaller than between a raw score of 15 and a raw score of 16. With the scale scores, however, the difference between a reading comprehension score of 450 and 451 means the same in terms of the underlying reading comprehension achievement dimension as does the difference between scale scores of 750 and 751.

Two assumptions underlie this definition of the equal interval scale. One is that the raw score scale is ordinal in the achievement dimension sense; that is, the higher the score value, the higher the level of achievement. The other assumption is that if the various intervals between points on the ordinal scale were stretched or shrunk in such a way that a superimposed equal interval scale would correspond with them, then the frequency distribution over the equal interval scale would have a specific form for a specific population (Technical Bulletin No. 1. CTBS/S 1974, p. 10). In this context, it is assumed that the United States school population in any one grade at any given point in time will be "normal" for a general achievement measure

expressed in terms of an equal interval scale. If the raw score scales are transformed so that the frequency distribution over the transformed scale is "normal," then an equal interval scale may be superimposed upon that transformed scale and a set of raw score to equal interval scale score correspondences is determined. It is because of this comprehensive and comparative nature of the scale scores that they were the ones utilized in the study. The scale scores were considered more representative of actual achievement than the raw scores.

The next consideration in determining quantifiers that reflected student achievement in reading and mathematics was the problem of a rational comparison between IGE schools. The students in the selected I & R units were multiaged. Generally the schools were multigraded, but some units had students predominantly at the lower elementary level, which would compare to grade 4 in a graded school; some units had students at the upper intermediate level (grade 6) and, other units had students in the entire intermediate range. Naturally the units with the older students would have higher scale scores than the units with the younger students. In addition, if a younger student had a scale score equal to an older student, it was necessary to say that the younger student was in fact achieving at a higher level than the older student. These circumstances necessitated the creation of a converted score that reflected the age of the students at the time of testing. For this reason the scale scores were converted to Z scores and then to T scores. Since the scale scores are equal interval in nature, a linear transformation on the scale scores could be effected

without disturbing the equal interval characteristic. The following formula was used to convert the scores:

$$Z = \frac{SS - \mu}{\sigma}$$

SS represents the actual student scale score; μ represents the mean value of the scale score for the standardization sample, and σ represents the standard deviation of the mean value for the standardization sample. Because Z scores have a very narrow range and are both positive and negative, the Z scores were converted to T scores. The following formula was utilized to convert Z scores to T scores:

$$T = 10\ Z + 50$$

The next consideration in the derivation of appropriate achievement scores for this study was that of deciding whether to convert gross unit mean scale scores, grade mean scale scores or individual student scale scores to Z scores and hence to T scores. The California Test Bureau provided scale scores for three categories.

The study was concerned with I & R unit mean measures of student achievement and I & R unit mean measures of teacher effectiveness. The question that arose was whether unit gross mean scale scores, a weighted grade mean scale score or the mean of the individual scale scores gave the best estimate of unit achievement. Each of these scores were considered in turn. The vocabulary scale scores from two schools, chosen at random, were used in considering this matter.

The following examples illustrate the different Z scores for the same group of students based upon the different calculation procedures for School No. 123847. The first calculation method utilized gross

unit measures only. This includes a mean age for the entire unit and a mean scale score for the entire unit. Appendix F contains tables for the determination of grade equivalent at the time of testing, mean scale scores, and standard deviations of the CTBS/S standardization sample. The calculation for the student Z score, based on gross unit data is presented in Table 3.

TABLE 3

Z SCORE CALCULATION BASED UPON GROSS UNIT MEASURES

Student Mean Age in Months	Actual Unit Scale Score	Mean Scale Score	Standard Deviation	Mean Z Score for Student
135	510.8	460	82.7	.6143

The second calculation procedure utilized mean grade data. A Z score for each grade was first calculated. These Z scores were then weighted according to the number of students in each grade. A mean Z score was then calculated. This information is presented in Table 4.

TABLE 4

Z SCORE CALCULATION BASED UPON MEAN WEIGHTED GRADE DATA

Mean Age in Months	Number of Cases	Actual Scale Score	Mean Scale Score	Standard Deviation	Mean Z Score for Student
119	5	459	408	72.98	.6988
132	7	516	451	80.24	.8101
144	12	529	481	89.0	.5393

Weighted Z Scores

.6988 x 5 = 3.4941
.8101 x 7 = 5.6707
.5393 x 12= 6.4716
Total Z =15.6364

Mean Z score for unit student = 15.6364 ÷ 24 = .6515

The third method of calculating the mean Z scores was to determine the Z score for each student and then to average these scores in order to get a mean Z score for the unit student. These calculations are presented in Table 5. The mean scores in each case were based upon the student's (a) actual scale score, (b) chronological age, (c) the grade equivalent, (d) the mean scale score and (e) its standard deviation (See Appendix F). It can be observed that the Z scores from the weighted grade data and the individual data are very nearly equal. They differed by 5/1000 of one standard deviation. The Z score calculated from the unit data on the other hand, differed markedly from the individual and grade scores. (Approximately 4/100 of a standard deviation).

TABLE 5

Z SCORE CALCULATION BASED UPON INDIVIDUAL STUDENT DATA

Age in Months	Actual Scale Score	Mean Scale Score	Standard Deviation	Z Score
113	507	389.5	70.43	1.6683
121	440	411.5	73.49	.3878
117	447	401.5	71.96	.6323
123	468	422.0	74.78	.6151
122	433	416.5	74.00	.2230
125	601	430.5	76.34	2.2334
134	541	457.0	81.80	1.0269
135	516	460.0	82.70	.6771
135	557	460.0	82.70	1.1729
134	557	457.0	81.80	1.2225
127	468	434.5	77.12	.4344
132	373	451.0	80.24	-.9721
142	601	474.0	87.20	1.4564
146	673	487.5	90.80	2.0430
141	601	471.5	86.75	1.4928
147	633	488.5	91.31	1.5825
144	528	481.0	89.00	.5281
139	507	468.0	85.40	.4567
146	528	487.5	90.80	.4460
153	468	504.0	95.90	-.3754
148	516	491.0	91.82	.2723
140	454	471.0	86.30	-.1970
140	468	471.0	86.30	-.0348
145	373	484.0	89.90	-1.2347
			TOTAL Z =	15.7575

The mean Z score for the unit student is 15.7575 ÷ 24 = .6566

The three different calculations determined three unequal Z scores. These were:

Based upon gross unit data:	.6143
Based upon weighted grade data:	.6515
Based upon individual data:	.6566

Vocabulary scores from a second school were given the same treatment (See Appendix G for this detailed calculation). A similar relationship occurred between the different methods of calculation. The results are presented below for school No. 196754.

	Z Scores
Based upon gross unit data:	.1716
Based upon weighted grade data:	.2217
Based upon individual data:	.2392

The mean weighted grade score and the mean individual score differed by 17/1000 of a standard deviation, while the gross unit score differed from the other two by approximately 5/100 of a standard deviation.

The reason that the Z scores are not equal is due to the linear characteristics of chronological age and grade equivalence and the non-linear characteristic of the mean scale scores and their standard deviations. Appendix H illustrates this non linear phenomenon. Two observations can be made from data in this appendix. The first is that the difference in scale score points between grades 4.7 and 5.7 was greater than the difference between 5.7 and 6.7. The second observation was that the standard deviation between grade levels increased as the grade levels increased. This means that a Z score calculation based upon average scale scores and an average standard deviation over a span of years, in this case from grades 4 through 6 would be a less reliable estimate than a Z score calculation based upon the average scale score and standard deviation over a one year period. The calculations presented in the two school examples supported this argument.

Although it is not possible to prove conclusively, one may consider, from a practical standpoint, that the mean weighted grade Z scores are a good approximation or estimation of the mean individual scores. These are the scores therefore that were used in this study to represent student achievement in reading and mathematics. As discussed earlier, these Z scores were converted to T scores for easier reading.

Correlational Tests of the Hypotheses

The computer program WISE*STAT.DISTX (Spuck, Stofflet, and Fleckenstein, 1971) was employed for computing the correlational statistics of the study. The independent variables were: I & R unit total effectiveness, instructional program (reading) effectiveness, instructional program (mathematics) effectiveness, staff development effectiveness, home-school-community relations effectiveness, organizational operations (procedural) effectiveness, and organizational operations (substantive) effectiveness. The dependent variables were: reading vocabulary, reading comprehension, reading total, mathematics computation, mathematics concepts, mathematics applications, and mathematics total.

The hypotheses, stated in Chapter I, were as follows:

Basic Hypotheses

1. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in student achievement in total reading.

2. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

Subhypotheses;

1. There is no significant relationship between unit mean scores in instructional program (reading) effectiveness and:

   a. Vocabulary unit mean scores
   b. Comprehension unit mean scores
   c. Total reading unit mean scores

2. There is no significant relationship between unit mean scores in instructional program (mathematics) effectiveness and:

   a. Computation unit mean scores
   b. Concepts unit mean scores
   c. Applications unit mean scores
   d. Total mathematics unit mean scores

3. There is no significant relationship between unit mean scores in I & R unit organizational operations (procedural) effectiveness and:

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores
   c. Total reading unit mean scores
   d. Mathematics computation unit mean scores
   e. Mathematics concepts unit mean scores
   f. Mathematics applications unit mean scores
   g. Total mathematics unit mean scores

4. There is no significant relationship between unit mean scores of I & R unit organizational operations (substantive) effectiveness and:

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores
   c. Total reading unit mean scores
   d. Mathematics computation unit mean scores
   e. Mathematics concepts unit mean scores
   f. Mathematics applications unit mean scores
   g. Total mathematics unit mean scores

5. There is no significant relationship between unit mean scores of I & R unit home-school community relations effectiveness and

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores
   c. Total reading unit mean scores
   d. Mathematics computation unit mean scores
   e. Mathematics concepts unit mean scores
   f. Mathematics applications unit mean scores
   g. Total mathematics unit mean scores

The descriptive statistics from the sample distribution of the independent and dependent variables are presented in Tables 6 and 7. These statistics are, respectively, the mean, standard deviation, skew, probability of skew, kurtosis, and probability of kurtosis for each independent and dependent variable.

Glass and Stanley, (1970, p. 88) have defined skew as "The degree to which the frequency distribution of a group of scores is asymmetrical." This implies that in a symmetric distribution, the measure of skewness is 0. A positively skewed distribution has scores that extend further above the mean than the smaller scores extend below it, while for a negatively skewed distribution, the reverse is true. Kurtosis refers to the "peakedness" of the distribution. A normal distribution is said to be mesokurtic. A peaked curve is labelled as leptokurtic while a flat curve is platykurtic. In the WISE*STAT.DISTX computer program (Spuck, et al., 1971) the normal curve is represented as having a kurtosis statistic of 0, the leptokurtic curve as a statistic greater than 0 and the platykurtic curve has a statistic less than 0. The probability associated with a sample distribution's skew and kurtosis indicates the probability with which the skew and kurtosis is likely to occur by chance. The coefficients of skewness in Table 6 revealed that 4 of the independent variables had a slight positive skew and that 3 had a negative skew. The kurtosis coefficients of the independent variables tended to be slightly negative, indicating a somewhat platykurtic curve. As shown in Table 7, the majority of dependent variables had positive skew coefficients and negative kurtosis coefficients. It should

TABLE 6

DESCRIPTIVE STATISTICS OF SAMPLE DISTRIBUTION OF INDEPENDENT VARIABLES

Variable	Mean	Standard Deviation	SKEW	Probability of SKEW	Kurtosis	Probability of Kurtosis
I & R Unit Total Effectiveness	3.6778	.4495	.4555	.6538	-.4724	.6422
Instructional Programming (Reading) Effectiveness	3.7713	.4754	.2297	.8133	-.3638	.7171
Instructional Programming (Math) Effectiveness	3.7972	.4942	.0515	.9578	-.9897	.6766
Staff Development Effectiveness	3.3413	.7326	-1.7042	.0847	.6332	.5340
Home-School-Community Effectiveness	3.8014	.6119	-.2798	.7766	-1.3565	.1717
Organizational Operations (Procedural) Effectiveness	3.8772	.6332	-.7401	.5338	-.3963	.6946
Organizational Operations (Substantive) Effectiveness	3.3466	.5746	1.0282	.3047	-.4551	.6541

TABLE 7

DESCRIPTIVE STATISTICS OF SAMPLE DISTRIBUTION OF DEPENDENT VARIABLES

Variable	Mean	Standard Deviation	Skewness	Probability of Skewness	Kurtosis	Probability of Kurtosis
Reading Vocabulary	50.7144	5.8296	-1.8261	.0645	-.2163	.8234
Reading Comprehension	50.9471	6.2872	.7498	.5398	2.9022	.0041
Reading Total	51.0825	6.7669	.5751	.5725	2.6190	.0088
Math Computation	50.0273	5.1987	.3038	.7594	-.1487	.8765
Math Concepts	50.1229	4.4902	.0246	.9785	-.0406	.9665
Math Applications	50.4849	5.0974	.1370	.8862	-.8012	.5711
Math Total	50.3665	5.1650	.3506	.7264	-.0249	.9783

also be observed in this table that all the mean achievement scores in the 42 I & R units are just slightly above the mean scores for the CTBS/S standardization group.

Table 8 presents the intercorrelations of the 7 independent variables. The majority of these relationships were found to be positive and significant at the .05 level. Table 9 presents the intercorrelations of the dependent variables. All relationships were significant at the .05 level. The ideal predictive situation (Kerlinger, p. 622, 1973) occurs when there is a high correlation between the independent and dependent variables but a low correlation among the independent variables. A low correlation between independent variables, however, is often not easy to achieve. This fact complicates the interpretation as it becomes difficult to determine the relative influence on the dependent variables of the independent variables.

Table 10 presents the correlations between the dependent and the independent variables. The correlations were found to be low. None were significant at the .05 level. Approximately one-third of the relationships were slightly negative while the remaining two-thirds were slightly positive. The hypotheses stated that there were no significant relationships between the independent and dependent measures. The correlation in Table 10 substantiate this fact. The null hypotheses, on the basis of these correlational statistics, therefore, could not be rejected.

The sample of 42 I & R units was stratified on the basis of "large city" and "other" where a large city was defined as having a

TABLE 8

CORRELATIONS OF THE INDEPENDENT VARIABLES

Variable	1	2	3	4	5	6	7
1) Instructional Program Reading Effectiveness	1.00						
2) Instructional Program Math Effectiveness	.761*	1.00					
3) Staff Development Effectiveness	.505*	.543*	1.00				
4) Home-School-Community Relations Effectiveness	.668*	.521*	.478	1.00			
5) Organizational Operations (Procedural) Effectiveness	.481*	.270	.514*	.681*	1.00		
6) Organizational Operations (Substantive) Effectiveness	.669*	.664*	.639*	.711*	.611*	1.00	
7) I & R Unit Total Effectiveness	.879*	.828*	.734	.790*	.686*	.882*	1.00

*Significant at the .05 level

TABLE 9

CORRELATIONS OF THE DEPENDENT VARIABLES

Variable	1	2	3	4	5	6	7
Reading Vocabulary	1.00						
Reading Comprehension	.942*	1.00					
Reading Total	.959*	.996*	1.00				
Math Computation	.728*	.690*	.706*	1.00			
Math Concepts	.806*	.765*	.778*	.873*	1.00		
Math Application	.780*	.751*	.761*	.890*	.906*	1.00	
Math Total	.770*	.733*	.746*	.960*	.948*	.960*	1.00

*Significant at the .05 level

TABLE 10

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF I & R UNIT EFFECTIVENESS SCORES (N=42)

	Instructional Program (Reading)	Instructional Program (Math)	Staff Development	Home-School-Community Relations	Organizational Operations (Procedural)	Organizational Operations (Substantive)	Total I&R Effectiveness
Dependent Variables							
Reading Vocabulary	.014 (.926)	.025 (.871)	.245 (.114)	.076 (.640)	.020 (.894)	.207 (.185)	.106 (.511)
Reading Comprehension	.035 (.820)	.057 (.722)	.179 (.256)	.022 (.883)	-.021 (.893)	.157 (.320)	.087 (.589)
Reading Total	.029 (.850)	.049 (.755)	.187 (.233)	.019 (.898)	-.014 (.927)	.158 (.319)	.086 (.596)
Math Computation	-.122 (.554)	-.228 (.142)	.019 (.901)	-.094 (.561)	-.061 (.703)	-.031 (.842)	-.124 (.562)
Math Concepts	-.041 (.791)	-.177 (.261)	.037 (.810)	-.015 (.920)	.001 (.991)	.046 (.771)	-.047 (.763)
Math Applications	-.032 (.833)	-.119 (.541)	.126 (.567)	.003 (.981)	.062 (.697)	.131 (.588)	.019 (.902)
Math Total	-.077 (.633)	-.195 (.213)	.047 (.763)	-.082 (.611)	-.033 (.829)	.018 (.905)	-.080 (.621)

Note. Exact probabilities in parentheses.
Degrees of freedom = 40.

population of more than 200,000 people and the second or "other" category was defined as an incorporated village, town, or city with a population less than 200,000. There were 9 large cities and 33 villages, towns, or small cities in the second category. Table 11 presents the correlations between the dependent and independent variables in the city category. All the correlations between the dependent variables of reading and mathematics and the independent variables of instructional program (reading) and instructional program (mathematics) were slightly negative, although not significant. Although the majority of the other correlations were slightly positive, they were not significant at the .05 level.

Table 12 presents the correlations between the dependent and independent variables in the second category, the "other" I & R units. The majority of correlations in this table between the reading dependent variables and the separate independent variables of I & R unit effectiveness indicated a slightly positive relationship, although not significant at the .05 level. More than one-half of the correlations between the mathematics dependent variables and the independent variables of I & R unit effectiveness were slightly negative. One of these, the negative correlation between mathematics computation and home-school-community relations was significant at the .05 level. The remaining correlations were not significant at that level.

As discussed in Chapter II, the items in the I & R unit Operations Questionnaire were placed into four scales and were subjected to a factor analysis. In the factor analysis, the first scale,

TABLE 11

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF I & R UNIT EFFECTIVENESS SCORES (N=9)

	Instructional Program (Reading)	Instructional Program (Math)	Staff Development	Home-School-Community Relations	Organizational Operations (Procedural)	Organizational Operations (Substantive)	Total I & R Effectiveness
Dependent Variables							
Reading Vocabulary	-.098 (.796)	-.184 (.638)	.514 (.155)	.270 (.513)	.038 (.919)	.122 (.751)	.011 (.976)
Reading Comprehension	-.126 (.745)	-.164 (.676)	.547 (.126)	.266 (.506)	-.023 (.951)	.151 (.698)	.011 (.977)
Reading Total	-.131 (.735)	-.195 (.618)	.517 (.152)	.249 (.523)	-.005 (.987)	.127 (.742)	-.008 (.981)
Math Computation	-.160 (.682)	-.211 (.591)	.259 (.506)	.357 (.347)	.136 (.725)	-.114 (.766)	-.071 (.850)
Math Concepts	-.168 (.668)	-.302 (.566)	.042 (.911)	.177 (.651)	-.135 (.727)	-.219 (.576)	-.195 (.618)
Math Applications	-.242 (.536)	-.243 (.534)	.281 (.531)	.117 (.761)	-.218 (.579)	-.205 (.601)	-.185 (.637)
Math Total	-.142 (.716)	-.235 (.548)	.204 (.602)	.200 (.609)	-.087 (.818)	-.199 (.612)	-.136 (.726)

Note. Exact probabilities levels in parentheses.
Degrees of freedom = 7.

TABLE 17

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF I & R UNIT EFFECTIVENESS SCORES (N=33)

	Instructional Program (Reading)	Instructional Program (Math)	Staff Development	Home-School-Community Relations	Organizational Operations (Procedural)	Organizational Operations (Substantive)	Total I&R Effectiveness
Dependent Variables							
Reading Vocabulary	.102 (.579)	.148 (.584)	.301 (.086)	-.093 (.614)	.045 (.797)	.177 (.673)	.160 (.622)
Reading Comprehension	.129 (.518)	.168 (.647)	.165 (.640)	-.137 (.546)	-.005 (.977)	.099 (.590)	.118 (.521)
Reading Total	.124 (.502)	.174 (.665)	.190 (.289)	-.142 (.563)	.001 (.992)	.104 (.572)	.124 (.502)
Math Computation	-.106 (.565)	-.275 (.118)	.030 (.862)	-.340 (.050)	-.091 (.619)	-.111 (.545)	-.174 (.666)
Math Concepts	.025 (.885)	-.147 (.580)	.102 (.579)	-.163 (.632)	.048 (.785)	.037 (.831)	-.011 (.949)
Math Applications	.065 (.721)	-.091 (.622)	.184 (.307)	-.128 (.514)	.151 (.595)	.141 (.561)	.078 (.669)
Math Total	-.041 (.814)	-.207 (.245)	.079 (.666)	-.270 (.125)	-.008 (.963)	-.012 (.944)	-.083 (.652)

Note. Exact probabilities in parentheses.
Degrees of freedom = 31.

instructional program was subdivided into two factors, which were labelled instructional program I and instructional program II (Appendix C). Since there were no significant positive correlations between the scales of the I & R Unit Operations Questionnaire and the reading and mathematics scales, it seemed advisable to submit some of the items from the questionnaire to further study. It was decided, therefore, to compute correlations between the instructional program factor I items and the dependent scales of reading and mathematics.

Table 13 presents the correlations for the total sample between the independent variables of instructional program (reading) factor I items and the dependent variables of reading vocabulary, reading comprehension, and reading total. None of these correlations were significant at the .05 level.

Table 14 presents the correlations for the total sample between the independent variables of instructional program (mathematics) factor I items and the dependent variables of mathematics computation, mathematics concepts, mathematics applications and mathematics total. In this set of correlations, there was only one that was significant at the .05 level (No. 15) and that correlation was negative.

Table 15 presents the correlations for the large city category between the independent variables of instructional program (reading) factor I items and the dependent reading variables. In this set of correlations, there was only one item (No. 12) from the teacher effectiveness questionnaire that correlated at the .05 significance level with a dependent variable (reading total). That correlation also was negative.

TABLE 13

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT READING ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (READING) FACTOR 1 ITEM SCORES (N=42)

Dependent Variable Name	Instructional Program (Reading) Factor I Items 1	2	4	5	6	7	8
Reading Vocabulary	.033 (.830)	-.134 (.599)	.127 (.571)	.022 (.884)	.071 (.661)	.200 (.202)	.128 (.575)
Reading Comprehension	.080 (.620)	-.080 (.620)	.158 (.318)	.054 (.734)	.087 (.590)	.237 (.127)	.127 (.570)
Reading Total	.072 (.653)	-.084 (.601)	.143 (.630)	.055 (.729)	.081 (.616)	.223 (.152)	.121 (.550)

	Factor I Items (continued) 9	10	12	15	16	17	18
Reading Vocabulary	.039 (.800)	.027 (.860)	-.185 (.239)	-.062 (.698)	-.007 (.966)	.002 (.988)	.034 (.825)
Reading Comprehension	.048 (.762)	.026 (.864)	-.169 (.284)	-.058 (.715)	.056 (.723)	.028 (.853)	.051 (.748)
Reading Total	.032 (.836)	.032 (.834)	-.168 (.287)	-.065 (.684)	.038 (.806)	.025 (.867)	.051 (.745)

NOTE: Exact probabilities in parentheses.
Degrees of freedom = 40.

TABLE 14

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT MATHEMATICS ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (MATH) FACTOR 1 ITEM SCORES
(N=42)

Dependent Variable Name	Instructional Program (Math) Factor I Items						
	1	2	4	5	6	7	8
Math Computation	-.187 (.234)	-.178 (.259)	-.074 (.646)	-.164 (.299)	-.263 (.089)	-.065 (.687)	-.153 (.666)
Math Concepts	-.191 (.224)	-.101 (.530)	-.083 (.606)	-.209 (.180)	-.195 (.213)	.045 (.775)	-.124 (.558)
Math Applications	-.096 (.551)	-.030 (.846)	-.019 (.903)	-.116 (.528)	-.134 (.598)	-.018 (.907)	-.103 (.523)
Math Total	-.180 (.253)	-.113 (.518)	-.084 (.602)	-.180 (.252)	-.215 (.169)	-.025 (.867)	-.139 (.618)
	Factor I Items (continued)						
	9	10	12	15	16	17	18
Math Computation	-.107 (.505)	-.096 (.554)	-.208 (.183)	-.329 (.031)	-.198 (.206)	-.105 (.513)	-.130 (.584)
Math Concepts	-.142 (.627)	-.071 (.658)	-.170 (.282)	-.229 (.141)	-.079 (.624)	-.109 (.503)	-.074 (.646)
Math Applications	-.099 (.541)	.005 (.974)	-.189 (.228)	-.180 (.252)	-.092 (.568)	-.070 (.662)	-.018 (.904)
Math Total	-.148 (.647)	-.082 (.612)	-.183 (.244)	-.268 (.083)	-.129 (.580)	-.093 (.563)	-.102 (.528)

NOTE: Exact probabilities in parentheses.
Degrees of freedom = 40.

TABLE 15

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT READING ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (READING) FACTOR 1 ITEM SCORES
(N=9)

Dependent Variable Name	Instructional Program (Reading) Factor 1 Item Numbers						
	1	2	4	5	6	7	8
Reading Vocabulary	-.098 (.797)	-.140 (.719)	.228 (.560)	-.197 (.615)	-.019 (.961)	.314 (.585)	.279 (.528)
Reading Comprehension	-.133 (.731)	-.194 (.621)	.212 (.589)	-.228 (.560)	-.069 (.853)	.337 (.623)	.263 (.500)
Reading Total	-.137 (.724)	-.186 (.635)	.211 (.591)	-.228 (.559)	-.066 (.861)	.315 (.588)	.266 (.505)

	Factor 1 Item Numbers (continued)						
	9	10	12	15	16	17	18
Reading Vocabulary	.275 (.521)	-.068 (.856)	-.631 (.067)	-.140 (.718)	-.142 (.715)	.041 (.914)	-.217 (.580)
Reading Comprehension	.302 (.567)	-.117 (.761)	-.652 (.055)	-.152 (.697)	-.148 (.704)	.042 (.910)	-.193 (.622)
Reading Total	.266 (.505)	-.105 (.782)	-.659 (.052)	-.167 (.669)	-.166 (.671)	.024 (.949)	-.224 (.566)

Note. Exact probabilities in parentheses.
Degrees of freedom = 7.

Table 16 presents the correlations between the independent variables of instructional program (mathematics) factor I items and the dependent mathematics variables for the large city category of the sample. There were no correlations in this table that were significant at the .05 level. The majority of the correlations are negative.

Table 17 presents the correlations between the independent variables of instructional program (reading) factor I items and the dependent reading variables for the "other" category of the sample. Almost all of the correlations were positive, but not significantly so.

Table 18 presents the correlations between the independent variables of instructional program (mathematics) factor I items and the dependent mathematics variables for the "other" category of the sample. The majority of these correlations were negative but only two were significant at the .05 level.

The Minitab statistical computing system (Ryan, Joiner, Ryan, 1974) provides a scattergram diagram printout of correlations. This system plots an independent variable against a dependent variable for every element in the sample. Such a diagram allows the analyst to study correlational relationships more intensely. If there were a curvilinear relationship between two sets of data, for example, the correlation between these two sets of data would be close to 0 and would suggest no relationship, when in fact, there is a relationship. A scattergram plotting helps the analyst see such a relationship. Table 19 depicts the relationship between the independent variable, I & R unit total effectiveness and the dependent variable, total reading. The correlation

TABLE 16

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT MATHEMATICS ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (MATH) FACTOR 1 ITEM SCORES (N=9)

Dependent Variable Name	Instructional Program (Math) Factor I Items 1	2	4	5	6	7	8
Math Computation	-.231 (.554)	-.112 (.770)	.409 (.274)	-.228 (.561)	-.283 (.535)	.011 (.977)	-.137 (.724)
Math Concepts	-.369 (.330)	-.087 (.818)	.160 (.681)	-.387 (.305)	-.332 (.615)	-.002 (.991)	-.228 (.560)
Math Applications	-.201 (.609)	-.063 (.866)	.180 (.646)	-.401 (.285)	-.175 (.655)	.044 (.906)	-.202 (.606)
Math Total	-.249 (.522)	-.061 (.871)	.253 (.516)	-.340 (.427)	-.223 (.569)	.029 (.939)	-.155 (.691)

	Factor I Items (continued) 9	10	12	15	16	17	18
Math Computation	.333 (.616)	.067 (.858)	-.570 (.107)	-.234 (.550)	-.255 (.512)	-.261 (.502)	-.284 (.536)
Math Concepts	.075 (.842)	-.093 (.807)	-.507 (.162)	-.216 (.582)	-.243 (.534)	-.387 (.304)	-.410 (.273)
Math Applications	.180 (.647)	-.026 (.946)	-.526 (.144)	-.136 (.725)	-.252 (.519)	-.292 (.549)	-.358 (.347)
Math Total	.169 (.666)	-.029 (.939)	-.513 (.156)	-.134 (.729)	-.221 (.573)	-.308 (.576)	-.360 (.344)

Note: Exact probabilities in parentheses.
Degrees of freedom = 7.

TABLE 17

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT READING ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (READING) FACTOR 1 ITEM SCORES (N=33)

Dependent Variable Name	Instructional Program (Reading) Factor 1 Item Numbers						
	1	2	4	5	6	7	8
Reading Vocabulary	.080 (.661)	-.005 (.976)	.058 (.746)	.196 (.275)	.132 (.531)	.316 (.070)	.028 (.873)
Reading Comprehension	.152 (.598)	.068 (.707)	.120 (.513)	.242 (.172)	.157 (.615)	.322 (.065)	.046 (.793)
Reading Total	.144 (.572)	.066 (.716)	.096 (.600)	.249 (.160)	.150 (.590)	.315 (.071)	.035 (.839)
	Factor 1 Items (continued)						
	9	10	12	15	16	17	18
Reading Vocabulary	-.059 (.744)	-.043 (.808)	.063 (.706)	-.103 (.576)	.117 (.525)	.100 (.588)	.159 (.620)
Reading Comprehension	-.041 (.816)	.056 (.753)	.060 (.737)	-.077 (.675)	.205 (.251)	.113 (.537)	.152 (.597)
Reading Total	-.053 (.765)	.062 (.733)	.070 (.702)	-.085 (.643)	.188 (.295)	.122 (.505)	.167 (.645)

Note: Exact probabilities in parentheses.
Degrees of freedom = 31.

TABLE 18

CORRELATION BETWEEN DEPENDENT VARIABLES OF STUDENT MATHEMATICS ACHIEVEMENT SCORES AND INDEPENDENT VARIABLES OF INSTRUCTIONAL PROGRAM (MATH) FACTOR I ITEM SCORES (N=33)

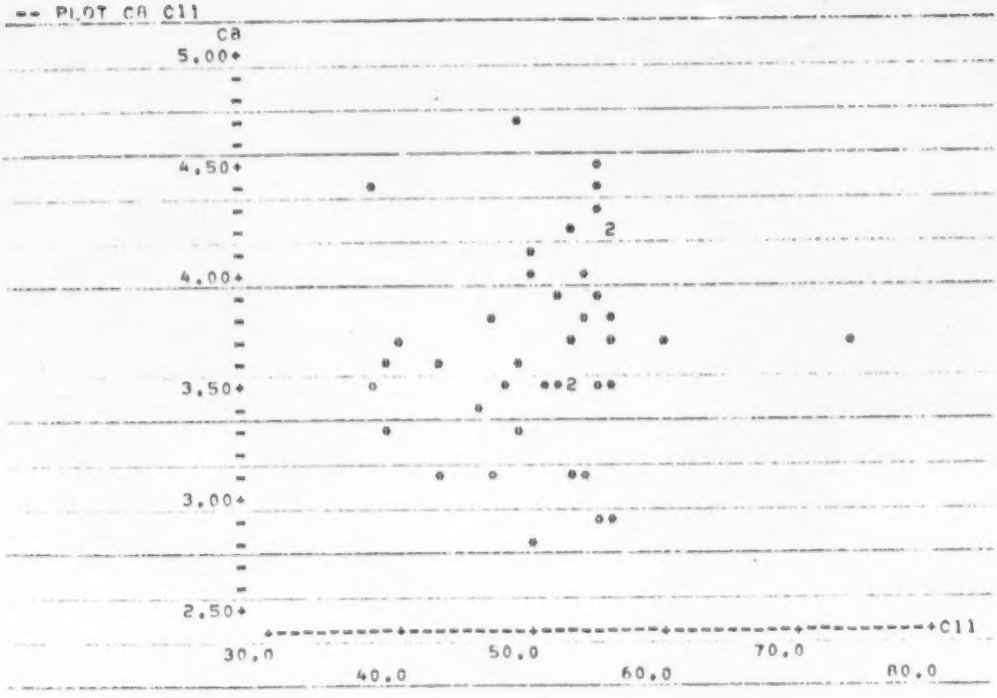
Dependent Variable Name	Instructional Program (Math) Factor I Items 1	2	4	5	6	7	8
Math Computation	-.229 (.197)	-.125 (.504)	-.300 (.087)	-.207 (.246)	-.313 (.072)	-.060 (.738)	-.226 (.203)
Math Concepts	-.177 (.326)	-.027 (.876)	-.214 (.229)	-.189 (.293)	-.187 (.299)	.093 (.613)	-.136 (.543)
Math Applications	-.107 (.562)	.084 (.648)	-.120 (.511)	-.045 (.800)	-.160 (.622)	.000 (.993)	-.128 (.516)
Math Total	-.207 (.247)	-.049 (.784)	-.253 (.153)	-.170 (.653)	-.257 (.146)	-.011 (.950)	-.192 (.283)

	Factor 1 item (continued) 9	10	12	15	16	17	18
Math Computation	-.320 (.067)	-.215 (.228)	-.075 (.681)	-.487 (.004)	-.205 (.252)	-.003 (.983)	-.118 (.521)
Math Concepts	-.279 (.112)	-.120 (.511)	-.034 (.844)	-.325 (.062)	-.007 (.969)	-.033 (.851)	.017 (.922)
Math Application	-.257 (.146)	-.038 (.826)	-.065 (.719)	-.298 (.088)	-.034 (.847)	.060 (.739)	.070 (.699)
Math Total	-.321 (.065)	-.159 (.621)	-.054 (.762)	-.422 (.014)	-.103 (.575)	.029 (.866)	-.046 (.797)

NOTE: Exact probabilities in parentheses.
Degrees of freedom = 31.

TABLE 19

CORRELATION BETWEEN I&R UNIT TOTAL EFFECTIVENESS AND TOTAL READING
(N=42)



-- CORR C8 C11

CORRELATION OF C8 AND C11 = .086

NOTE: C8 = I&R unit total effectiveness score.
C11 = Total reading score.

between these variables is .086. A study of the plotting revealed no special relationship.

Table 20 depicts the relationship between the independent variable, I & R unit total effectiveness, and the dependent variable, total mathematics. The correlation between these variables was -.080. Again, no special relationship was discernible from the diagram.

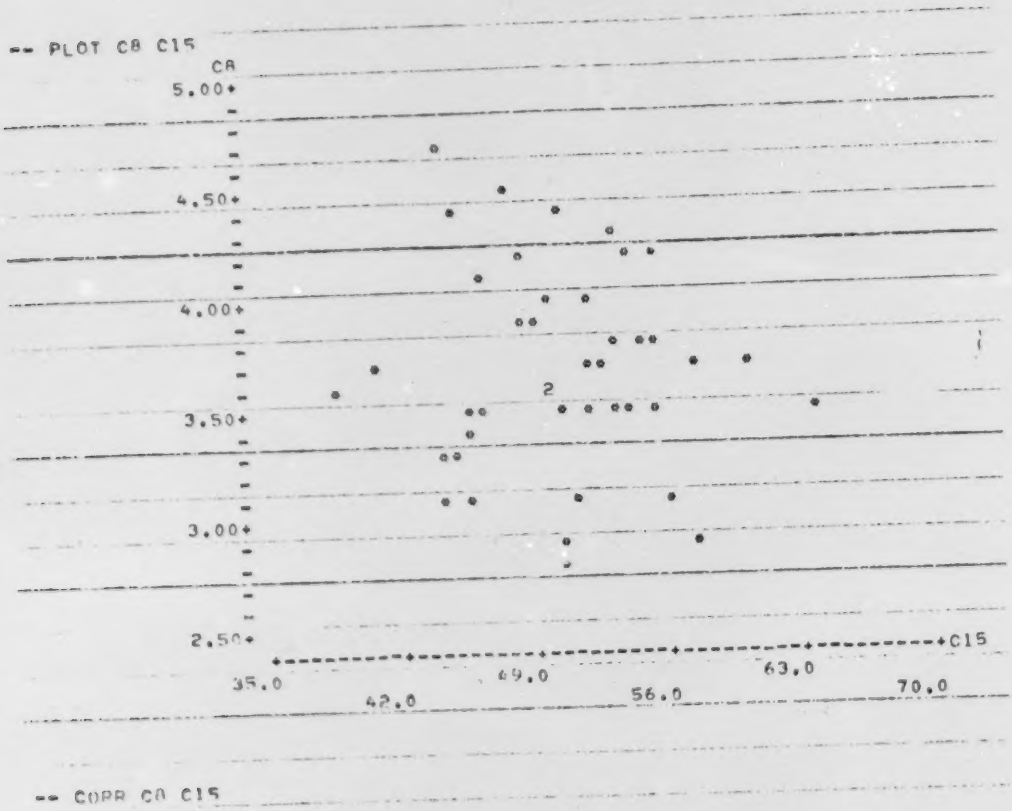
In summary, the correlational statistics presented in this study indicated that there was no statistical significance between I & R unit effectiveness and student achievement in reading and mathematics in ICE schools. This conclusion prevailed when the entire sample of 42 I & R units was analyzed as a whole and when the sample was analyzed on the basis of the two strata, "city" and "other". The conclusion of no significant relationships also existed when the independent variables of instructional program, factor 1 items (reading) were correlated with the student dependent variables of reading, and when the instructional program, factor 1 items (mathematics) were correlated with the student dependent variables of mathematics.

Multiple Regression Tests of the Hypotheses

Multiple linear regression techniques were also employed to examine the individual and combined effects of the set of independent variables on the dependent variables. The analysis was performed through the use of PROGRAM WISE*LIB.SETSTP, a University of Wisconsin computer program (Stofflet and Spuck, 1971) for regression analysis. One regression model was generated for relating all the independent

TABLE 20

CORRELATION BETWEEN I&R UNIT TOTAL EFFECTIVENESS AND TOTAL MATHEMATICS (N=42)



-- CORR C8 C15

CORRELATION OF C8 AND C15 = -.080

NOTE: C8 = I&R unit total effectiveness score.
C15 = Total mathematics score.

variables to each dependent variable. The independent variables were designated as free variables and were regressed on the dependent variable employing a forward selection procedure. The basic approach in the forward selection procedure is that which chooses the independent variable which has the highest correlation with the dependent variable. A regression model using only this one independent variable is then determined. The second independent variable chosen is that one whose partial correlation, given the variable already in the equation, with the dependent variable is the highest. This second variable is then added to the model and a new solution is determined. This procedure is continued until all variables have been included in the model.

The regression tables presented in this study have two parts; the first part presents the following information:

1. The name of the independent variable entered into the regression equation
2. Multiple correlation coefficient--measures the combined importance of the several independent factors as a means of explaining the differences in the dependent factor.
3. Coefficient of multiple determination--the square of the coefficient of multiple correlation. It indicates the proportion of variation in the dependent variable which is explained by the linear combination of theindividual variables in the regression equation.
4. F test for significance--indicates the level of significance of the variation in the dependent variable explained by its

regression on the independent variable in the equation.

5. Partial F value--indicates the level of significance of an independent variable in increasing the coefficient of determination as it enters the regression equation.

The second part of the regression model table presents the standardized regression coefficient for each independent variable in the regression equation at each step.

Table 21 presents the relationships between the independent variables of I & R unit effectiveness and the dependent variable of reading vocabulary. Over 12 per cent of the variation in reading vocabulary was explained by the independent variables. The F test indicated that none of the predictor variables accounted for a significant amount of the variation in reading vocabulary. This table illustrated that the independent variable of staff development has the greatest impact on the dependent variable, although this relationship was not significant.

Table 22 presents the relationships between the independent variables of I & R unit effectiveness and the dependent variable of reading comprehension. Approximately 7.5 per cent of the variation in reading comprehension was explained by the independent variables. Staff development again had the greatest influence, although not at the .05 level of significance.

Table 23 presents the relationships between the independent variables of I & R unit effectiveness and the dependent variable of total reading. Less than 8 per cent of the variation in total reading was determined by the independent variables. Although there were no

significant relationships in the regression analyses between the dependent reading variables and the independent measures, as Tables 21 to 23 illustrate, the staff development scale of the I & R Unit Operations Questionnaire correlated positively with the reading scales consistently and accounted for the most variation in those variables--ranging from 3.2 per cent in reading comprehension to 6.0 per cent in reading vocabulary.

Tables 24 to 27 illustrate the relationship between the scores of the independent variables of I & R unit effectiveness and the dependent variables of student achievement in mathematics.

Table 24 depicts the relationship between the five independent variables of I & R unit effectiveness and the dependent variable of mathematics computation. The five steps in this model illustrated that the independent variables explained approximately 11 per cent of the variation in the dependent variable. The F tests indicated that these relationships were not significant at the .05 level. The standardized regression coefficients indicated a negative direction in the relationship between the dependent variable of mathematics computation and the independent measures of instructional program (mathematics), which explained the greatest amount of variation (5.2 per cent).

Table 25 illustrates the relationship between the five independent measures of I & R unit effectiveness and the dependent measure of mathematics concepts. The amount of variation explained by these independent measures was slightly more than 9 per cent. The F tests indicated that the relationships were not significant. The

TABLE 21

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF READING VOCABULARY

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Staff Development	.2453	.0602	2.56	2.56
2	I & R Unit Instructional Program (Reading)	.2762	.0763	1.61	.68
3	I & R Unit Organizational Operations (Substantive)	.3165	.1002	1.41	1.01
4	I & R Unit Organizational Operations (Procedural)	.3505	.1226	1.29	.95
5	I & R Unit School Home-School Community Relations	.3512	.1233	1.01	.03

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Staff Development	Instructional Program (Reading)	Organizational Operations (Substantive)	Organizational Operations (Procedural)	Home-School Community Relations
1	.2453				
2	.3195	-.1471			
3	.2243	-.2566	.2355		
4	.2623	-.2366	.3166	-.1942	
5	.2658	-.2508	.3019	-.2112	.0455

TABLE 22

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF READING COMPREHENSION

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Staff Development	.1789	.0320	1.32	1.32
2	I & R Unit Organizational Operations (Procedural)	.2218	.0492	1.01	.71
3	I & R Unit Organizational Operations (Substantive)	.2543	.0647	.88	.63
4	I & R Unit Instructional Program (Reading)	.2708	.0733	.73	.34
5	I & R Unit Home-School-Community Relations	.2724	.0742	.58	.04

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Staff Development	Organizational Operations (Procedural)	Organizational Operations (Substantive)	Instructional Program (Reading)	Home-School-Community Relations
1	.1789				
2	.2575	-.1529			
3	.1786	-.2217	.1789		
4	.1927	-.2099	.2475	-.1268	
5	.1886	-.1906	.2642	.1107	.0516

TABLE 23

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF TOTAL READING

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Staff Development	.1873	.0351	1.45	1.45
2	I & R Unit Organizational Operations (Procedural)	.2271	.0516	1.06	.68
3	I & R Unit Organizational Operations (Substantive)	.2551	.0651	.88	.55
4	I & R Unit Instructional Program (Reading)	.2754	.0758	.76	.43
5	I & R Unit Home-School-Community Relations	.2777	.0771	.60	.05

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Staff Development	Organizational Operations Procedures	Organizational Operations (Substantive)	Instructional Program (Reading)	Home-School-Community Relations
1	.1873				
2	.2643	.1498			
3	.1906	-.2141	.1671		
4	.2063	-.2009	.2437	-.1416	
5	.2016	-.1783	.2632	-.1228	-.0603

TABLE 24

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF MATH COMPUTATION

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Instructional Program (Math)	.2283	.0521	2.20	2.20
2	I & R Unit Staff Development	.2848	.0811	1.72	1.23
3	I & R Unit Organizational Operations (Procedural)	.2975	.0885	1.23	.31
4	I & R Unit Organizational Operations (Substantive)	.3312	.1097	1.14	.88
5	I & R Unit Home-School-Community Relations	.3312	.1097	.89	.00

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Instructional Program (Math)	Staff Development	Organizational Operations (Procedural)	Organizational Operations (Substantive)	Home-School-Community Relations
1	-.2283				
2	-.3384	.2028			
3	-.3397	.2551	-.1005		
4	-.4439	.2047	-.1957	.2442	
5	-.4435	.2045	-.1949	.2448	-.0018

TABLE 25

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF MATH CONCEPTS

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Instructional Program (Math)	.1770	.0313	1.29	1.29
2	I & R Unit Organizational Operations (Substantive)	.2737	.0749	1.58	1.84
3	I & R Unit Organizational Operations (Procedural)	.2885	.0832	1.15	.34
4	I & R Unit Staff Development	.3052	.0932	.95	.41
5	I & R Unit Home-School-Community Relations	.3060	.0936	.74	.02

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Instructional Program (Math)	Organizational Operations (Substantive)	Organizational Operations (Procedural)	Staff Development	Home-School-Community Relations
1	-.1770				
2	-.3527	.2729			
3	-.3776	.3609	-.1777		
4	-.4160	.1188	-.1525	.1378	
5	-.4239	.3067	-.1648	.1415	.0346

standardized regression coefficients again illustrated a negative direction in the relationship between the dependent variable and the independent variable which explained the greatest variation.

Table 26 illustrates the relationship between the five independent measures of I & R unit effectiveness and the dependent measure of mathematics applications. The amount of variation explained by these independent measures was slightly less than 12 per cent. The F tests indicated no significant relationship. The standardized regression coefficients indicated a positive direction between the dependent measure and the independent measure of organizational operations (substantive) which entered the equation in the first step.

Table 27 illustrates the relationship between the five independent measures of I & R unit effectiveness and the dependent measure of mathematics total. The amount of variation explained by these independent measures was slightly less than 11 per cent. The F tests indicated that these relationships were not significant.

The standardized regression coefficients in all the dependent mathematics measures indicated a slightly positive relationship with the independent measures of staff development and organizational operations (substantive) and indicated a slightly negative relationship with the independent measures of instructional program (mathematics), organizational operations (procedural), and home-school-community relations.

The data analysis for the seven regression models presented in Tables 21 through 27 demonstrated no significant relationships between

TABLE 26

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF MATH APPLICATIONS

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1	I & R Unit Organizational Operations (Substantive)	.1314	.0173	.70	.70
2	I & R Unit Instructional Program (Math)	.2971	.0883	1.89	3.04
3	I & R Unit Staff Development	.3193	.1019	1.44	.58
4	I & R Unit Organizational Operations (Procedural)	.3388	.1148	1.20	.54
5	I & R Unit Home-School-Community Relations	.3424	.1173	.96	.10

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Organizational Operations (Substantive)	Instructional Program (Math)	Staff Development	Organizational Operations (Procedural)	Home-School-Community Relations
1	.1314				
2	.3057	-.3483			
3	.2787	-.3834	.1560		
4	.3717	-.4246	.1968	-.1514	
5	.4004	-.4058	.1880	-.1137	-.0820

TABLE 27

REGRESSION ANALYSIS WITH DEPENDENT VARIABLE OF MATH TOTAL

Step No.	Variable Entered	Multiple Correlation Coefficient	Coefficient of Determination	F Test for Significance	Partial F Value
1.	I & R Unit Instructional Program (Math)	.1951	.0381	1.58	1.58
2	I & R Unit Organizational Operations (Substantive)	.2709	.0734	1.54	1.49
3	I & R Unit Organizational Operations (Procedural)	.2937	.0863	1.20	.54
4	I & R Unit Staff Development	.3273	.1071	1.11	.86
5	I & R Unit Home-School-Community Relations	.3296	.1086	.88	.06

STANDARDIZED REGRESSION COEFFICIENT FOR EACH STEP

Step No.	Instructional Program (Math)	Organizational Operations (Substantive)	Organizational Operations (Procedural)	Staff Development	Home-School-Community Relations
1	-.1951				
2	-.3534	.2457			
3	-.3843	.3552	-.1465		
4	-.4399	.2943	-.1968	.1995	
5	-.4253	.3165	-.1677	.1927	-.0633

the dependent measures of student cognitive achievement and the dependent measures of I & R unit effectiveness. The null hypotheses, therefore, could not be rejected.

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Technical Report No. 385
Part 2 of 2 Parts

EFFECTIVENESS OF THE INSTRUCTION AND RESEARCH UNIT AND STUDENT ACHIEVEMENT IN IGE SCHOOLS

by

Conrad W. Sigurdson

Report from the Project on
Organization for Instruction and
Administrative Arrangements

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Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

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This Technical Report is a doctoral dissertation reporting research supported by the Wisconsin Research and Development Center for Cognitive Learning. Since it has been approved by a University Examining Committee, it has not been reviewed by the Center. It is published by the Center as a record of some of the Center's activities and as a service to the student. The bound original is in the University of Wisconsin Memorial Library.

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WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

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The mission of the Wisconsin Research and Development Center for Cognitive Learning is to help learners develop as rapidly and effectively as possible their potential as human beings and as contributing members of society. The R&D Center is striving to fulfill this goal by

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	vi
LIST OF FIGURES	viii
CHAPTER	
I. INTRODUCTION	1
Background of the Study	2
Theoretical Framework and Related Literature	8
I & R Unit Effectiveness	13
Statement of the Problem and Hypotheses	18
Significance of the Study	20
Limitations of the Study	21
II. DESIGN AND METHODOLOGY	22
Description of Study Instruments	22
I & R Unit Operations Questionnaire	22
Comprehensive Test of Basic Skills	26
Population and Sample Selection	30
Procedures for Data Collection	34
Statistical Techniques	34
Summary	36
III. ANALYSIS OF THE DATA	37
Correlational Tests of the Hypotheses	45
Multiple Regression Tests of the Hypotheses	66
IV. SUMMARY, FINDINGS CONCLUSIONS, AND IMPLICATIONS	80
Summary of the Study	80
Findings and Conclusions	86
Findings	86
Conclusions	91

IV. (continued) Page

Implications for Practice and Further Research 93
Implications for Practice. 94
Implications for Further Research. 95

BIBLIOGRAPHY 97

APPENDICES 102

APPENDIX A. 103

APPENDIX B. 111

APPENDIX C. 113

APPENDIX D. 118

APPENDIX E. 126

APPENDIX F. 134

APPENDIX G. 138

APPENDIX H. 140

LIST OF TABLES

TABLE		Page
1.	Reliability Levels for the I & R Unit Operations Questionnaire	25
2.	Numbers of Items and Time Limits by Skills Area and Tests for the CTBS/S, Level 2	28
3.	Z Score Calculation Based Upon Gross Unit Measures.	41
4.	Z Score Calculation Based Upon Mean Weighted Grade Data	42
5.	Z Score Calculation Based Upon Individual Student Data.	43
6.	Descriptive Statistics of Sample Distribution of Independent Variables	48
7.	Descriptive Statistics of Sample Distribution of Dependent Variables	49
8.	Correlations of the Independent Variables	51
9.	Correlations of the Dependent Variables	52
10.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=42)	53
11.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=9)	55
12.	Correlation Between Dependent Variables of Student Achievement Scores and Independent Variables of I & R Unit Effectiveness Scores (N=33).	56
13.	Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor 1 Item Scores (N=42)	58
14.	Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=42).	59

Table Page

15. Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor I Item Scores (N=9) 60

16. Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=9) . . . 62

17. Correlation Between Dependent Variables of Student Reading Achievement Scores and Independent Variables of Instructional Program (Reading) Factor 1 Item Scores (N=33). 63

18. Correlation Between Dependent Variables of Student Mathematics Achievement Scores and Independent Variables of Instructional Program (Math) Factor 1 Item Scores (N=33). 64

19. Correlation Between I & R Unit Total Effectiveness and Total Reading (N=42). 65

20. Correlation Between I & R Unit Total Effectiveness and Total Mathematics 67

21. Regression Analysis With Dependent Variable of Reading Vocabulary. 70

22. Regression Analysis With Dependent Variable of Reading Comprehension 71

23. Regression Analysis With Dependent Variable of Total Reading 72

24. Regression Analysis With Dependent Variable of Math Computation 74

25. Regression Analysis With Dependent Variable of Math Concepts. 75

26. Regression Analysis With Dependent Variable of Math Applications. 77

27. Regression Analysis With Dependent Variable of Math Total . . 78

LIST OF FIGURES

FIGURE — Page

1. Components of Individually Guided Education 3
2. Multiunit Organization of an IGE School of 400-600 Students 5
3. The School As a General System 9
4. The Normative and Personal Dimensions of Social Behavior . 11
5. The I & R Unit as a General and Social System. 12

EFFECTIVENESS OF THE INSTRUCTION AND RESEARCH UNIT AND STUDENT ACHIEVEMENT IN IGE SCHOOLS

Conrad Wilhelm Sigurdson

Under the supervision of Professor James M. Lipham

The purpose of this study was to ascertain the extent to which organizational aspects of Individually Guided Education schools relate to cognitive achievement of students in those schools. The theoretical framework for the study was conceptualized within general and social systems theories which suggest relationships between inputs, processes, and outputs. The Instruction and Research Unit of the IGE school was the unit of analysis. The theories suggested linkages between Instruction and Research unit effectiveness and student cognitive achievement in reading and mathematics. Effectiveness of the I & R unit was measured by the I & R Unit Operations Questionnaire whereby teachers report perceptions of how well their unit accomplishes the institutional expectations or specifically, the performance objectives set for their unit. Student Achievement in reading and mathematics was measured by a standardized test battery, the Comprehensive Tests of Basic Skills, Form S.

Data were collected from 42 I & R units, selected at random from a national population of 959 schools which were in at least their third year of IGE implementation. Unit mean scores were computed for the I & R Unit Operations Questionnaire and for the student achievement tests in reading and mathematics. In general staff members perceived their I & R unit as being effective. The achievement levels of students in IGE schools in both reading and

mathematics compared favorably with the National norms.

Computer programs were employed to obtain Pearson product-moment correlations and to solve multiple regression equations. These correlations and equations were used to test the hypotheses in the study.

Two basic null hypotheses were tested to determine interrelationships of I & R unit effectiveness and student cognitive achievement:

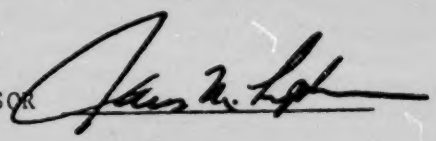
1. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total reading.
2. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

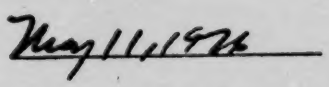
In addition to these two main hypotheses, subhypotheses relating to subscales the I & R Unit Operations Questionnaire and subscales of the reading and mathematics tests were tested.

The correlational statistics revealed that there was no statistical significance between I & R unit effectiveness and student achievement in reading and mathematics. The stepwise linear regression analysis indicated that the independent variables of I & R unit effectiveness accounted for a very small part of the variance in the dependent achievement variables of reading and mathematics.

Based upon the findings of this study, it is not possible to state empirically, that there is any relationship between the effectiveness of the I & R unit and student achievement in that unit.

Suggestions were offered for further definitive research in this domain.

MAJOR PROFESSOR 

DATE 

CHAPTER IV

SUMMARY, FINDINGS, CONCLUSIONS, AND IMPLICATIONS

The first section of this chapter contains a summary of the study. The second summarizes the findings and gives the conclusions of the study. The concluding section presents implications for practice and for further research.

Summary of the Study

The purpose of this study was to examine the relationships between organizational effectiveness of the school and student cognitive achievement in IGE Multiunit Elementary Schools. Development of this multiunit form of school organisation at the Wisconsin Research and Development Center for Cognitive Learning, was initiated in 1965. It is a comprehensive system of education and instruction designed to produce higher educational achievements by providing for individual differences in rate and style of learning. (Klausmeier, et al., 1971, p. 1).

The organizational structure of the multiunit school consists of interrelated groups at three distinct levels of operation: the instruction and research units at the student level, the instructional improvement committee at the school building level, and the systemwide program committee at the district level. (Klausmeier, et al., 1971b,

p. 20). This organizational plan utilizes differentiated staffing, team teaching, and shared decision making. The prototypic I & R unit has a unit leader, 3-5 teachers, a teacher aide, an instructional secretary, and an intern. The major function of each I & R unit is to plan, implement, and evaluate the instructional program for each unit. This study was designed to investigate the relationships between the effectiveness of the I & R units of IGE schools and student output in reading and mathematics.

Performance objectives for I & R units were developed by personnel of the R & D Center. These objectives have the broad intent of increasing student output. To attain this broad objective, I & R staffs must implement specific instructional programming practices, staff development activities, operational procedures, and home-school-community strategies (Klausmeier, Quilling, Sorenson, Way, and Glasrud, 1971, pp. 93-126). Proponents of IGE expect that a school adopting this alternative system of education with central office support will achieve its goals for the student as a direct result of utilizing all or most of the practices contained in the list of performance objectives.

In a recent study (Evers, 1974), these performance objectives were utilized in the development of the I & R Unit Operations Questionnaire. This instrument provides a quantitative measure of the effectiveness of I & R units. This study theorized that if staff effectiveness is to be meaningful in IGE schools, it must be related to such output measures as student achievement. Academic achievement

is but one of the many outputs of the school. Schooling is expected to produce many others, such as affective change, retention rates, proportion of students going to college, income and occupation of graduates, and teacher change and development to mention a few.

The theoretical background of the study was that of general systems and social systems theories having inputs, processes, outputs, and feedback mechanisms. The school was considered as a general system, where inputs in the form of operands and operators are transformed into outputs, which alter future system activity. The processes which convert inputs into outputs bring social systems theory into perspective. The network of interpersonal relationships which constitutes the social system and its processes in this study is the school I & R unit. The inputs are the students, staff, and physical and financial resources. The outputs are the transformed students.

The present research theorized linkages between the I & R unit's effectiveness and student cognitive achievement in reading and mathematics. In terms of the I & R unit, effectiveness was measured by the I & R Unit Operations Questionnaire which reports teachers' perceptions of how well they believe they accomplish the institutional expectations, or more specifically, the performance objectives set for their unit. Student achievement in reading and mathematics was measured by the standardized tests battery: Comprehensive Tests of Basic Skills, Form S, 1974. (CTBS/S).

The CTBS/S is a series of batteries for kindergarten through grade 12. The batteries comprise seven overlapping levels, and

contain tests in three basic skills areas. This study utilized the reading and mathematics sections of the level 2 battery. The grade designations for level 2 are 4.5 through 6.9.

The study population was developed from the list of 959 IGE/MUS-Es in the 1973-74 Multiunit School Directory published by the Wisconsin Research and Development Center for Cognitive Learning. The use of this particular directory for determining the population meant that all schools in the study would have been in at least their third year of implementing IGE. Minimal criteria for participation were set so that all schools participating in the study were generally comparable. The minimal criteria acceptable for the study were those developed at the R & D Center that must be met for a school to qualify to be labelled IGE (Evers, et al., 1975). In addition, specific minimal criteria established for this study were:

1. The I & R units must have implemented the instructional programming model in reading for at least two complete years and in mathematics for at least one complete year.
2. The school must have an active Instructional Improvement Committee which meets at least twice a month.

The defined population for this study was all intermediate units in the 959 schools which met the minimal criteria. A stratified random sampling procedure was employed to select 42 schools which met the criteria and agreed to participate. Telephone calls were made to the principals of the schools to determine their admissibility and to seek their cooperation and participation. An intermediate unit

within each school that agreed to participate was selected randomly. Students within the selected unit were chosen randomly for the reading and mathematics tests. Researchers from the R & D Center travelled to these schools to administer the student achievement tests. The teacher questionnaires were sent to the schools two weeks prior to the researcher's visit and were collected by him/her on the day of student testing.

The unit of analysis for the study was that of the I & R unit. Unit mean scores for the I & R Unit Operations Questionnaire were computed. In addition, unit mean scores for student achievement in reading and mathematics were calculated. The raw student data were converted to scale scores by the California Test Bureau, publishers of the student tests. These scores were then converted to Z scores and T scores based upon the student scores, the mean value and standard deviation of the scale score for the standardization sample of the California Tests of Basic Skills. Computer programs were employed to obtain alpha reliability coefficients, Pearson product-moment correlations, and to solve multiple regression equations.

The following null hypotheses were tested to determine inter-relationships of I & R unit effectiveness and student cognitive achievement:

The basic hypotheses:

1. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in student achievement in total reading.

2. There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

Subhypotheses:

1. There is no significant relationship between unit mean scores in instructional program (reading) effectiveness and:

   a. Vocabulary unit mean scores
   b. Comprehension unit mean scores
   c. Total reading unit mean scores

2. There is no significant relationship between unit mean scores in instructional program (mathematics) effectiveness and:

   a. Computation unit mean scores
   b. Concepts unit mean scores
   c. Applications unit mean scores
   d. Total mathematics unit mean scores

3. There is no significant relationship between unit mean scores in I & R unit organizational operations (procedural) effectiveness and:

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores
   c. Total reading unit mean scores
   d. Mathematics computation unit mean scores
   e. Mathematics concepts unit mean scores
   f. Mathematics applications unit mean scores
   g. Total mathematics unit mean scores

4. There is no significant relationship between unit mean scores of I & R unit organizational operations (substantive) effectiveness and:

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores
   c. Total reading unit mean scores
   d. Mathematics computation unit mean scores
   e. Mathematics concepts unit mean scores
   f. Mathematics applications unit mean scores
   g. Total mathematics unit mean scores

5. There is no significant relationship between unit mean scores of I & R unit home-school-community relations effectiveness and:

   a. Reading vocabulary unit mean scores
   b. Reading comprehension unit mean scores

c. Total reading unit mean scores
d. Mathematics computation unit mean scores
e. Mathematics concepts unit mean scores
f. Mathematics applications unit mean scores
g. Total mathematics unit mean scores

Findings and Conclusions

This section contains an analysis of the two basic hypotheses and the five subhypotheses tested.

Findings

The first basic hypothesis stated:

> There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in student achievement in total reading.

The Pearson product moment correlation indicated a relationship slightly above zero. The regression analysis indicated that less than 8 per cent of the variation in total reading was explained by I & R unit total effectiveness. This null hypothesis therefore could not be rejected.

The second basic hypothesis stated:

> There is no significant relationship between the unit mean scores in I & R unit total effectiveness and unit mean scores in total mathematics.

The Pearson product-moment correlation reported a relationship slightly below zero. The regression analysis indicated that less than 11 per cent of variation was due to I & R total unit effectiveness. No

relationships were significant at the .05 level. This null hypothesis could not be rejected.

Five subhypotheses were determined relating to the separate scales of the I & R Unit Operations Questionnaire and the separate scales of the achievement tests. The first subhypothesis stated:

There is no significant relationship between unit mean scores in instructional program (reading) effectiveness and:

a. Vocabulary unit mean scores
b. Comprehension unit mean scores
c. Total reading unit mean scores

The Pearson product-moment correlation revealed relationships that were slightly above zero. The regression equations indicated that this independent variable did not contribute significantly to the variance of the reading variables. The null hypothesis, therefore, could not be rejected.

The second subhypothesis stated:

There is no significant relationship between unit mean scores in instructional program (mathematics) effectiveness and:

a. Computation unit mean scores
b. Concepts unit mean scores
c. Applications unit mean scores
d. Total mathematics unit mean scores

The Pearson product-moment correlations were slightly negative, although not significantly so. The regression analysis indicated that the independent variable did not contribute significantly to the dependent mathematics variables. This null hypothesis therefore, could not be rejected.

The third subhypothesis stated:

There is no significant relationship between unit mean scores in I & R unit organizational operations (procedural) effectiveness and:

a. Reading vocabulary unit mean scores
b. Reading comprehension unit mean scores
c. Total reading unit mean scores
d. Mathematics computation unit mean scores
e. Mathematics concepts unit mean scores
f. Mathematics applications unit mean scores
g. Total mathematics unit mean scores

The Pearson product-moment correlations revealed relationships very close to zero with each dependent variable. The regression equations indicated that this independent variable did not contribute a significant amount of variance to the dependent variables of reading and mathematics. The null hypothesis could not be rejected.

The fourth subhypothesis stated:

There is no significant relationship between unit mean scores of I & R unit organizational operations (substantive) effectiveness and:

a. Reading vocabulary unit mean scores
b. Reading comprehension unit mean scores
c. Total reading unit mean scores
d. Mathematics computation unit mean scores
e. Mathematics concepts unit mean scores
f. Mathematics applications unit mean scores
g. Total mathematics unit mean scores

The Pearson product-moment correlations indicated a slightly positive relationship in six of the seven relationships and a slightly negative correlation in the seventh case (math computation). None of these correlations was significant at the .05 level. The regression equations

indicated that an insignificant amount of variance was explained by this independent variable. This null hypothesis could not be rejected.

The fifth subhypothesis stated:

There is no significant relationship between unit mean scores of I & R unit school-community relations effectiveness and:

a. Reading vocabulary unit mean scores
b. Reading comprehension unit mean scores
c. Total reading unit mean scores
d. Mathematics computation unit mean scores
e. Mathematics concepts unit mean scores
f. Mathematics applications unit mean scores
g. Total mathematics unit mean scores

Pearson product-moment correlations indicated relationships close to zero in each case. The regression equations indicated that this independent variable had very little effect on the reading and mathematics dependent variables. This null hypothesis, therefore, could not be rejected.

In summary, none of the null hypotheses relating I & R unit effectiveness and student achievement in reading and mathematics could be rejected on the basis of the correlational and regression analyses.

A further correlational analysis was done on the basis of the stratified sample in this study. The sample of 42 I & R units was stratified on the basis of "large city" and "other" where the first category was considered as having a population greater than 200,000 people and the second category had a population less than 200,000. The purpose of this analysis was to discover whether certain relationships might exist in schools in one of the strata that did not exist in schools in the other. None of the correlations between the

independent variables of I & R unit effectiveness and the dependent variables of reading and mathematics achievement in the large city category were significant at the .05 level. In the second category only one correlation was significant at the .05 level. That correlation expressed a negative relationship between the independent variable of home-school-community relations and the dependent variable of mathematics computation. The remaining correlations were not significant at the .05 level.

One further correlational analysis was undertaken. This was an analysis between the independent variables of instructional program (reading) and instructional program (mathematics) factor 1 items and the dependent reading and mathematics scales. The purpose of this analysis was to look closely at individual items of an independent scale to see whether certain relationships might exist that did not exist in the scale as a whole. Pearson product-moment correlations were calculated between instructional program (reading) factor 1 items and the dependent reading scales for the entire sample and for the two strata in the sample. All the correlations were non-significant at the .05 level except one and that was negative. Pearson product-moment calculations were similarly calculated between instructional program (mathematics) factor I items and the dependent mathematics scales, in the total sample and the two strata. Three correlations out of a total of 84 were significant at the .05 level. These three correlations were negative.

A final analysis involved the use of the Minitab computing system (Ryan, et al., 1974). This computing system provides a scattergram printout, which allows one to ascertain whether certain relationships might exist that were not apparent in the Pearson product-moment correlations. A study of the plotting however, revealed no particular relationship.

Conclusions

Based upon the findings of this study, it is not possible to state empirically that a relationship exists between the effectiveness of the I & R unit and student achievement. The majority of correlations relating effectiveness to achievement were not significant at the .05 level. All regression equations indicated that the independent variables accounted for a very low amount of variance in the dependent achievement variables. Several factors may account for this relationship:

1. The I & R Unit Operations Questionnaire may not be sufficiently sensitive to distinguish levels of effectivenss in the teaching staffs. That is, it is possible that IGE makes a difference, but the instrument employed cannot measure that difference. Teaching effectiveness has traditionally been very difficult to measure. Biddle and Ellena (1964, p. 3) reported that the bulk of studies on teacher effectiveness has produced negligibl results. The teaching effects are often nearly indistinguishable from the effects of other agents, such as the socio-economi

status of parents, which make the effects of teacher contributions difficult to assess.

2. The self-report nature of the I & R unit operations questionnaire presents certain problems concerning accuracy of reporting perceptions. Teachers were asked to state their perceptions of their unit's effectiveness. This is a difficult task. Certain units may have students who are making great gains in achievement. These same unit staffs, however, may have very high expectations for themselves and feel that they are far from attaining the effectiveness level for which they are aiming and, as a result, feel that their effectiveness is still quite low. In other schools, the reverse may well be true. In some schools, the teaching staffs may be working very effectively and may report a high effectiveness but, at the same time, the students may be achieving at a reliatvely low level compared to national norms. These schools may be in an area that has traditionally had very low achievement scores. Their present scores could be a marked improvement over the past and still be low compared to national standards.
3. Achievement in a school is the result of many influences, in addition to being a complex concept itself which cannot be described adequately by any single measurement (Glass and Stanley, 1970, p. 121).
4. Although the schools that participated in the study were randomly selected initially, there was an element of self-

selection in the process in that when principals were telephoned and questioned about their programs, they were not asked to participate unless they met certain stringent criteria. Alternatively, some principals may have declined participation if they felt that their schools did not meet the study specifications. This factor may have resulted in excluding schools which would have had low effectiveness scores. In fact 29 of the 42 I & R units had a mean score of 3 on the Likert five point scale for the total I & R effectiveness measure, with only 3 I & R units with a lower score and 10 I & R units with a higher mean score. This narrow range made a positive or negative correlation with the dependent scores very difficult to achieve.

5. Another explanatory factor that may be that the degree to which I & R unit staffs meet their performance objectives has little relation to increasing student achievement output. It may be that the unique contribution of Individually Guided Education manifests itself in other areas of student life, such as citizenship growth, leadership development, self-reliance, independence of character, and democratic values and attitudes, to mention only a few.

Implications for Practice and Further Research

This concluding section includes the implications for practice in IGE schools and general suggestions for further research regarding

the operation of I & R units in IGE schools.

Implications for Practice

Social systems and general systems theories suggested that student cognitive output was dependent upon I & R unit effectiveness. Neither the correlational nor the regression analyses substantiated this relationship. This does not mean that the hypothesized relationship does not exist. It merely means that the particular measures utilized did not corroborate the hypotheses for the sample of schools selected for the study. It may well be that the hypothesized relationships will be found if other instruments are used. The lack of a positive relationship between I & R unit effectiveness and student cognitive achievement does not mean that achievement in IGE schools is lower than in non-IGE schools. As shown in Chapter III, the mean achievement scores in reading and mathematics for the 42 I & R units were slightly above the mean scores established for the standardization group of the California Tests of Basic Skills, Form S.

Some teachers and administrators in IGE schools may not have accepted greater cognitive achievement as a primary objective for their students. If greater cognitive achievement is an objective, then IGE school staffs must pay greater attention to the demands of the implementation processes which relate specifically to cognitive achievement. The instructional programming model sets a strict pattern to be followed. If this pattern is not implemented in IGE schools, it is likely that greater cognitive achievement will not occur, regardless of

the effectiveness of the I & R unit staffs. The practitioner should therefore pay substantial attention to utilizing properly the instructional programming model.

Implications for Further Research

Several questions for further research have arisen as a result of this study. The following appear worthy of consideration:

1. Would on-site observation of teachers by researchers detect levels of effectiveness in the teaching staffs of I & R units?
2. Would case studies which analyze the manifestations of the instructional programming model within the I & R unit reveal different degrees of effectiveness in the teaching staffs?
3. Would a similar study with schools stratified on the basis of socioeconomic status reveal meaningful relationships?
4. Would a study of student achievement in IGE schools, matched with non-IGE schools provide insight into the variables examined?
5. Should researchers study such characteristics as self-reliance, independence, and leadership of students in IGE schools?
6. Should a longitudinal study relating I & R unit effectiveness and student achievement be undertaken which would involve schools when they first implement IGE and for several years thereafter?

7. This study has involved a random number of students in the I & R units in IGE schools. Would a study on specific groups, such as high achievers or low achievers in these units, reveal important attributes and strengths of IGE?
8. I & R staffs spend a considerable amount of time each week in planning sessions. Much of this time is part of the official school day, which may mean less actual instructional time with students. A question that arises is whether there is an optimal amount of time that teachers should spend in face-to-face interaction with students. Specifically is there a relationship between cognitive achievement in a curricular area and student-teacher interaction time in that area.

In conclusion, it is hoped that this study has provided insights into organizational relationship and student cognitive achievement in IGE schools. Positive correlations between I & R unit effectiveness and student achievement in mathematics and reading were not substantiated. In general, however, staff members perceived their I & R units as being effective and student achievement in those units did compare favorably with the national norms of students in other schools.

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APPENDICES

APPENDIX A

Form Approved
OMB No: 51-S75077
Approval Expires June 1976

I AND R UNIT OPERATIONS QUESTIONNAIRE

You are participating in a national study conducted by the Wisconsin Research and Development Center for Cognitive Learning. The purpose of this instrument is to determine the effectiveness of the Instruction and Research Unit in IGE Multiunit Elementary Schools.

This instrument to be completed by the unit (team or learning community) leader and staff teachers consists of 50 operations items. Completion of the entire instrument should require about 30 minutes of your time. It is important that all items receive a response as any item left blank will give a distorted picture of your school. All responses will remain confidential and none will be identified by person, school, or school district.

Please answer the question about each item by placing your response in the space provided. Upon completing the instrument, please place it in the envelope provided and return it to the researcher visiting your school.

Your participation in this study is sincerely appreciated.

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I AND R UNIT OPERATIONS QUESTIONNAIRE

Directions: The following items are based upon the performance objectives identified by the Wisconsin R and D Center as being the responsibility of the I and R unit. Please indicate how effectively your unit achieves these objectives by circling the response which most accurately describes, in your opinion, the operations of your unit.

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

Reading	A. Instructional Program (Please answer separately for Reading and Mathematics in questions 1-18)	Mathematics
	Our I and R unit, in the curricular area to which we are applying the Instructional Programming Model:	
VE E SE I VI	1. Develops and/or selects outlines of skills and concepts to be learned which are appropriate to the student in the unit.	VE E SE I VI
VE E SE I VI	2. Develops and/or selects behavioral objectives related to the skill and concept outlines.	VE E SE I VI
VE E SE I VI	3. Specifies materials, equipment, personnel, space and time needed for instruction.	VE E SE I VI
VE E SE I VI	4. Uses a variety of materials for each of the identified instructional objectives.	VE E SE I VI
VE E SE I VI	5. Specifies teacher activities needed for instruction.	VE E SE I VI
VE E SE I VI	6. Preassesses students for attainment of the objectives within the first month of implementing the Instructional Programming Model.	VE E SE I VI

GO ON TO THE NEXT PAGE . . .

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

Reading			Mathematics
VE E SE I VI	7.	Preassesses students' motivational level, learning style, interest and attitudes, and special problems as soon after the preassessment of objectives attainment as the unit staff can conduct the assessment and utilize the results.	VE E SE I VI
VE E SE I VI	8.	Places students in initial groups in IGE curriculum areas based on preassessment results regarding achievement, learning style, motivational level, interest, or other relevant variable(s).	VE E SE I VI
VE E SE I VI	9.	Uses a variety of student grouping patterns in the course of a particular curriculum such as a) independent study, b) one-to-one (teacher-student), c) one-to-one (student-to-student) d) small group (3-11 students), e) medium group (12-19 students), f) class-sized groups (20-39 students), and g) large group (more than 30 students).	VE E SE I VI
VE E SE I VI	10.	Assesses students for attainment of objectives after instruction.	VE E SE I VI
VE E SE I VI	11.	Records assessment results in a usuable form (e.g., on charts, McBee cards, lists, or individual folders).	VE E SE I VI
VE E SE I VI	12.	Conducts evaluation regarding the percentage of students who attain specific objectives.	VE E SE I VI
VE E SE I VI	13.	Regroups students at least every two to three weeks based on needs and attainment of objectives.	VE E SE I VI
VE E SE I VI	14.	Plans for all I and R unit teachers to teach in the IGE subject-matter areas.	VE E SE I VI
VE E SE I VI	15.	Conducts evaluation regarding the effectiveness of the instructional materials currently in use.	VE E SE I VI

GO ON TO THE NEXT PAGE . . .

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

Reading		Mathematics
VE E SE I VI	16. Conducts evaluation regarding the effectiveness of the instructional techniques currently in use.	VE E SE I VI
VE E SE I VI	17. Conducts evaluation regarding the effectiveness of the assessment materials currently in use.	VE E SE I VI
VE E SE I VI	18. Conducts evaluation regarding the effectiveness of the assessment techniques currently in use.	VE E SE I VI

B. Staff Development

Our I and R unit:

VE E SE I VI 19. Participates in the school's staff development program.

VE E SE I VI 20. Participates in the evaluation of the school's staff development plan.

VE E SE I VI 21. Participates in the evaluation of the intern-student teacher program.

22. Meets together for at least three days prior to the opening of school:

VE E SE I VI a. to make immediate plans regarding student grouping patterns and scheduling for the first one to two weeks of school.

VE E SE I VI b. to make long-range plans regarding our I and R unit's instructional design and goals for the entire year.

VE E SE I VI 23. Meets at least one day per semester when children are not at school to extend IGE planning into other curricular areas.

GO ON TO THE NEXT PAGE . . .

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

C. Organizational Operations

Our I and R unit:

VE E SE I VI 24. Schedules unit meetings regularly.

VE E SE I VI 25. Schedules at least two hours per week with one hour in a single block to plan for instruction.

VE E SE I VI 26. Holds unit meetings during the regular staff working day.

VE E SE I VI 27. Requires the unit leader, unit teachers, interns, and student teachers assigned to the unit to attend unit meetings.

VE E SE I VI 28. Prepares and distributes an agenda to all personnel involved in the meeting prior to unit meeting time.

VE E SE I VI 29. Has its unit meetings chaired by the unit leader.

VE E SE I VI 30. Focuses discussion on agenda topics at unit meetings.

VE E SE I VI 31. Has consultants, teachers, IMC director (librarian), aides, and others attend unit meetings at our request.

VE E SE I VI 32. Keeps minutes of unit meetings.

VE E SE I VI 33. Distributes minutes of unit meetings to total unit staff, the IIC, and others who attend unit meetings.

VE E SE I VI 34. Holds goal-setting meetings at least once per semester.

VE E SE I VI 35. Holds curriculum design meetings at least once per semester.

VE E SE I VI 36. Holds meetings to evaluate instructional units, programs, and unit operations at least once per quarter.

VE E SE I VI 37. Holds groupings and scheduling meetings at least once every two weeks.

VE E SE I VI 38. Holds meetings whenever necessary to deal with immediate problems.

GO ON TO THE NEXT PAGE . . .

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

VE E SE I VI 39. Evaluates the flexibility of the schedule at least once per quarter.

VE E SE I VI 40. Assesses each unit member's expertise in subject matter at least once per year.

VE E SE I VI 41. Assesses each unit member's expertise in instructing various sizes and kinds of groups at least once per year.

VE E SE I VI 42. Provides at least five hours per week released time from instruction for the unit leader to plan, manage, study and conduct research.

VE E SE I VI 43. Provides at least one hour per week released time from instruction for teachers to plan, study and conduct research.

VE E SE I VI 44. Assigns aides (instructional and clerical) tasks according to broad guidelines established by the IIC and/or specific guidelines established by the unit.

VE E SE I VI 45. Assigns each teacher a specialization in a curriculum area, or teaching styles to develop, so that he/she can act as a resource person to the unit.

VE E SE I VI 46. Identifies each student in the unit with a teacher who monitors his/her progress during the year and takes initiative as required in the IGE subject-matter areas.

D. School-Community Relations

Our I and R unit:

VE E SE I VI 47. Identifies each student with a staff member for purposes of home-school relations, including conferences and home visits, as well as day-to-day guidance of the student and monitoring of his performance.

VE E SE I VI 48. Reports individual students' progress to parents.

GO ON TO THE NEXT PAGE . . .

VE = Very effectively
E = Effectively
SE = Somewhat effectively
I = Ineffectively
VI = Very ineffectively

VE E SE I VI 49. Cooperates with the IIC in interpreting the ICE/MUS-E concept to parents and residents in the school attendance area.

VE E SE I VI 50. Cooperates with the IIC in utilizing volunteer community personnel (e.g., parents, other adults, high school and college students, and people with special expertise) in the instructional program and other school activities.

Thank you for your cooperation.

APPENDIX B

Comprehensive Test of Basic Skills, Level 2 Forms
Expanded Edition

CTB/McGraw Hill, Del Monte ResearchPark, Monterey,
California, 1974

APPENDIX C

I & R Unit Operations Questionnaire Subdivided
Into Scales Based Upon Factor Loadings*

FACTOR 1
I & R Unit Instructional Program 1

1. Develops and/or selects outlines of skills and concepts to be learned which are appropriate to the student in the unit.

2. Develops and/or selects behavioral objectives related to the skill and concept outlines.

4. Uses a variety of materials for each of the identified instructional objectives.

5. Specifies teacher activities needed for instruction.

6. Preassesses students for attainment of the objectives within the first month of implementing the Instructional Programming Model.

7. Preassesses students' motivational level, learning style, interest and attitudes, and special problems as soon after the preassessment of objectives attainment as the unit staff can conduct the assessment and utilize the results.

8. Places students in initial groups in IGE curriculum areas based on preassessment results regarding achievement, learning style, motivational level, interest, or other relevant variable(s).

9. Uses a variety of student grouping patterns in the course of a particular curriculum such as a) independent study, b) one-to-one (teacher-student), c) one-to-one (student-to-student), d) small group (3-11 students), 3) medium group (12-19 students), f) class-sized groups (20-39 students), and g) large group (more than 30 students

12. Conducts evaluation regarding the percentage of students who attain specific objectives.

15. Conducts evaluation regarding the effectiveness of the instructional materials currently in use.

16. Conducts evaluation regarding the effectiveness of the instructional techniques currently in use.

17. Conducts evaluation regarding the effectiveness of the assessment materials currently in use.

18. Conducts evaluation regarding the effectiveness of the assessment techniques currently in use.

FACTOR 2
I & R Unit Organizational Operations (Procedural)

25. Schedules unit meetings regularly.

26. Schedules at least two hours per week with one hour in a single block to plan for instruction.

27. Holds unit meetings during the regular staff working day.

28. Requires the unit leader, unit teachers, interns, and student teachers assigned to the unit to attend unit meetings.

29. Prepares and distributes an agenda to all personnel involved in the meeting prior to unit meeting time.

30. Has its unit meetings chaired by the unit leader.

31. Focuses discussion on agenda topics at unit meetings.

32. Has consultants, teachers, IMC director (librarian), aides, and others attend unit meetings at our request.

33. Keeps minutes of unit meetings.

34. Distributes minutes of unit meetings to total unit staff, the IIC, and others who attend unit meetings.

FACTOR 3
I & R Unit School Community Relations

48. Identifies each student with a staff member for purposes of home-school relations, including conferences and home visits, as well as day-to-day guidance of the student and monitoring of his performanc

49. Reports individual students' progress to parents.

50. Cooperates with the IIC in interpreting the IGE/MUS-E concept to parents and residents in the school attendance area.

51. Cooperates with the IIC in utilizing volunteer community personnel (e.g., parents, other adults, high school and college students, and people with special expertise) in the instructional program and other school activities.

FACTOR 4
I & R Unit Organizational Operations (Substantive)

35. Holds goal-setting meetings at least once per semester.

36. Holds curriculum design meetings at least once per semester.

37. Holds meetings to evaluate instructional units, programs, and unit operations at least once per quarter.

38. Holds groupings and scheduling meetings at least once every two weeks.

39. Holds meetings whenever necessary to deal with immediate problems.

40. Evaluates the flexibility of the schedule at least once per quarter.

41. Assesses each unit member's expertise in subject matter at least once per year.

42. Assesses each unit member's expertise in instructing various sizes and kinds of groups at least once per year.

43. Provides at least five hours per week released time from instruction for the unit leader to plan, manage, study and conduct research.

44. Provides at least one hour per week released time from instruction for teachers to plan, study and conduct research.

45. Assigns aides (instructional and clerical) tasks according to broad guidelines established by the IIC and/or specific guidelines established by the unit.

46. Assigns each teacher a specialization in a curriculum area, or teaching styles to develop, so that he/she can act as a resource person to the unit.

47. Identifies each student in the unit with a teacher who monitors his/her progress during the year and takes initiative as required in the IGE subject-matter areas.

FACTOR 5
I & R Unit Staff Development

19. Participates in the school's staff development program.

20. Participates in the evaluation of the school's staff development plan.

21. Participates in the evaluation of the intern-student teacher program.

FACTOR 5 cont.

22. Meets together for at least three days prior to the opening of school to make immediate plans regarding student grouping patterns and scheduling for the first one to two weeks of school.

23. Meets together for at least three days prior to the opening of school to make long-range plans regarding our I and R unit's instructional design and goals for the entire year.

24. Meets at least one day per semester when children are not at school to extend IGE planning into other curricular areas.

FACTOR 6
I & R Unit Instructional Program 2

3. Specifies materials, equipment, personnel, space and time needed for instruction.

10. Assesses students for attainment of objectives after instruction.

11. Records assessment results in a usuable form (e.g., on charts, McBee cards, lists, or individual folders).

13. Regroups students at least every two or three weeks based on needs and attainment of objectives.

14. Plans for all I and R unit teachers to teach in the IGE subject-matter areas.

NOTE: Item 22b from the original instrument has been given the number 23. All the subsequent items have a number one greater than they had in the original instrument. This corresponds with the two numbering systems in the Evers Study.

APPENDIX D

		TELEPHONE SURVEY

CODE: C = Cities, 200,000 +
O = Others (Under 200,000)
1st # = Random Order
2nd # = Directory Number

CHECK APPROPRIATE BOX(ES):

☐ Yes, _____

☐ Maybe, _____

☐ No, _____

☐ Call back, _____

Name of School: _____

Location: _____

Phone: _____

Person Contacted: _____

Researcher: _____

Date: _____

Follow up letter sent on:

_____

_____

_____

Confirmation call back:

_____

_____

Inconvenient time for visitation:

_____

_____

Comments:

169

170

Telephone Interview to Identify 40 Schools
as Subjects for the "R-3 Correlational Studies"
and the "Evaluation of IGE vs. Non-IGE Study"

Comments

1a. Do you still consider your school an IGE school?

a) Yes

b) We're working on it

c) No. Would you mind telling us why not? _____

_____

1b. How many students are in your school? _____

We'd like to ask about your school's organization:

2. What grade level equivalents are included in your school? _____

3a. Is your school organized into units, teams, or learning communities?

a) Yes (this response includes "partially," "some," or "all" answers)

b) No (no units at all)

3b. How many units (learning communities) are in your school? _____

3c. Describe the unit (learning community) structure (excluding student teachers, interns, and aides). For each unit (learning community) give:

	1	2	3	4	5	6	7	8
Unit Name								
Number of teachers assigned to the unit full time (including unit leader)								
Number of pupils (as exact as you can give it)								
Grade level equivalents								
Does the unit staff meet at least once weekly?	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

COMMENTS:

Comments

3d. Does this description account for all pupils in the school?

a) Yes

b) No. If no, explain who isn't included in these units:

_____

1) kindergarten
2) special education pupils
3) other "regular" pupils (i.e., not special education)

4a. Do you have unit leaders (or learning community leaders) assigned for a year or more to each unit (learning community)?

a) Yes, for each unit (learning community)

b) Yes, for some units (learning communities); not for others

c) No, none at all

4b. Does your school have an Instructional Improvement Committee (IIC) or a Program Improvement Council (PIC)?

a) Yes

b) No

c) Don't know; if c is chosen, ask:

Do you meet regularly with the unit leaders (learning community leaders)?

1) Yes

2) No

4c. If yes, how many people are the regular members of this group? _____

Comments

4d. Does this include the principal and all unit leaders (learning community leaders)?

a) Yes

b) No

4e. How often does the IIC (or PIC) meet? _____

a) once a semester
b) once a month
c) twice a month (every two weeks)
d) once a week

5. Do you participate in activities with other IGE schools at least once a year? These could be schools within your district (such as in a Systemwide Program Committee [SPC]) or schools outside your district (such as a League, Network, FACT, or HUB).

a) Yes

b) No

Now I'd like information about your school's instructional program in reading, and math. First, we'll talk about reading. Generally, we're looking for a sequence in which your teachers identify reading objectives for the students in their unit, preassess for those objectives, then group students according to which objectives they need to master, instruct on those objectives, then test again, and regroup.

6a. Have you done this entire process for reading in your whole school?

a) Yes

b) No, explain which students are excluded _____

_____

Comments

6b. Have you done it for two years or more (at least since October, 1973)?

a) Yes

b) No

(Refer to Organizational chart, and say "As you know we are interested in collecting data in one intermediate unit. I'd like more specific information about units _____, _____, and _____." (the intermediate units)

7a. Are any of the unit leaders in these intermediate units new to their units as of this September ('75)?

a) Yes, in unit(s) _____, _____, _____, (discount those units)

b) No

7b. In any of these (remaining) units are more than half of the teachers new to the unit this September?

a) Yes, in unit(s) _____, _____, _____.

b) No

In any of these (remaining intermediate) units, we are looking for that same instruction sequence in relation to mathematics. That is, math objectives are set for the students in the unit, there is preassessment, grouping for instruction, postassessment, and regrouping.

Comments

7c. Have these units done this entire process in math for at least one year? (i.e., since September, '74)

a) Yes, in all units

b) No, only in units _____, and _____

c) No, not in any units

7d. Have the majority of students in this (these) unit(s) had this instructional sequence in math last year? (either in the unit they are presently in or in another unit?) Explain.

a) Yes, for unit(s) _____

b) No

If more than one intermediate unit is left, randomly choose intermediate unit for study, and solicit participation of the randomly selected unit. If they seem at all interested, ask:

8. Are there non-IGE schools in your district?

a) Yes, is so approximately how many? _____

b) No

c) I don't know

APPENDIX E

the Wisconsin Research and Development Center for Cognitive Learning

the University of Wisconsin · 1025 West Johnson Street · Madison, Wisconsin 53706 · (608) 262 - 4901

1975-76

R-3 Research Project

General Information

1. This is a national study involving 40 IGE schools. One intermediate unit/team from each school will be participating. Each school and each unit have been chosen randomly.

2. One or two researchers from the R and D Center will be visiting the intermediate unit/team during one school day to collect data during the month of January or February.

3. The principal and the selected team members will receive indepth questionnaires in advance of the school visits. A packet with instruments and instructions for the principal, team leader, and teachers will be sent to the school prior to the visitation. The instruments need not be filled out in one sitting. You will have a period of at least 2 weeks to complete them. Contained in this packet will be the following instruments:

   a. Principal Instruments (Total Time [#1 & 2] 25-30 minutes)

      1) Background Information and Organizational Structure Survey (Form P)
      The purpose of this instrument is to obtain background data and to determine the nature of the organizational structure in IGE schools. It requires approximately 30 minutes to complete.

      2) Time Allocation of Instructional Personnel
      The purpose of this instrument is to obtain information about the utilization of time by staff members in I & R units. It requires approximately 15 minutes to complete.

      3) School Expenditure Data Form
      The purpose of this instrument is to provide information about the major direct and indirect costs involved in the operation of an IGE school.

b. Unit Leader Instruments (Total Time 1 1/2-2 hours)

1) Background Information and Organizational Structure Survey (Form UL)
The purpose of this instrument is to obtain background data and to determine the nature of the organizational structure in IGE schools. It requires approximately 20 minutes to complete.

2) Decision Involvement Analysis
The purpose of this instrument is to determine the nature of involvement in the decision-making process in IGE schools. It requires approximately 15 minutes to complete.

3) Principal Leadership Assessment
The purpose of this instrument is to determine the nature of the principal's leadership style. It requires approximately 10 minutes to complete.

4) Job Satisfaction Survey
The purpose of this instrument is to determine the extent of satisfaction with various aspects of the job in IGE schools. It requires approximately 30 minutes to complete.

5) Time Allocation of Instructional Personnel
The purpose of this instrument is to obtain information about the utilization of time by staff members in I & R units. It requires approximately 15 minutes to complete.

*6) Unit/Team Operations Questionnaire (Effectiveness Measure)
The purpose of this instrument is to investigate the degree (as perceived by the teachers) to which the team/unit accomplishes particular tasks which have been identified as belonging to the teaching team/unit. It requires approximately 30 minutes to complete.

c. Unit Teacher Instruments (Total Time 2-2 1/2 hours)

1) Background Information and Organizational Structure Survey (Form T)
The purpose of this instrument is to obtain background data and to determine the nature of the organizational structure in IGE schools. It requires approximately 20 minutes to complete.

2) Decision Involvement Analysis
The purpose of this instrument is to determine the nature of involvement in the decision-making process in IGE schools. It requires approximately 15 minutes to complete.

3) Unit Leader Leadership Assessment
The purpose of this instrument is to determine the nature of the unit leader's leadership style. It requires approximately 10 minutes to complete.

4) Principal Leadership Assessment
The purpose of this instrument is to determine the nature of the principal's leadership style. It requires approximately 10 minutes to complete.

5) Job Satisfaction Survey
The purpose of this instrument is to determine the extent of satisfaction with various aspects of the job in IGE schools. It requires approximately 30 minutes to complete.

6) Time Allocation of Instructional Personnel
The purpose of this instrument is to obtain information about the utilization of time by staff members in I & R units. It requires approximately 15 minutes to complete.

*7) Unit/Team Operations Questionnaire (Effectiveness Measure)
The purpose of this instrument is to investigate the degree (as perceived by the teachers) to which the team/unit accomplishes particular tasks which have been identified as belonging to the teaching team/unit. It requires 30 minutes to complete.

4. During the visit, the researcher(s), in cooperation with the unit teachers will administer a standardized self concept survey to one third of the students in the unit, a mathematics standardized test to the second third of the unit, and a standardized reading test to the final third of the students in the unit. Thus, no student will take more than one test. These standarized instruments are:

*a. Intermediate Self Observation Scales (SOS) California Form (C)
This instrument takes approximately 25 minutes.

b. California Test of Basic Skills (Reading and Mathematics)-Form S
This instrument takes approximately 1 1/2 hours.

5. The purpose of this research is twofold:

a. We will relate the "effectiveness" of the unit to student affective behavior and student achievement. The question that arises is: "Is there a positive correlation between team or unit effectiveness and student self concept* and achievement?" We feel that in addition to being of significant value to researchers at the R & D Center, the answer to this question would be of great interest to you as you promote, develop and refine your IGE school.

*Emphasis supplied for this study only

b. We will be examining the factors (organizational structure and leadership) that contribute most strongly to teacher satisfaction.

6. a. We will send self concept and achievement profiles to each participating unit/team as soon as the publisher sends them to us--at no cost to the school.

b. When the entire study of 40 IGE schools is complete, we will send technical reports of the research as soon as the R & D Center makes them available--again at no cost to the school.

c. No schools or students will be identified in any reports.

7. Specific details on procedures will be sent to participating schools prior to visitation.

8. Additional R & D research, presently in the planning stage, will collect comparative school data on non-IGE schools.

R & D Research Team
Barbara Bocian
Robert Feldman
Diana Mendenhall
Conrad Sigurdson

Principal Investigators
Dr. James M. Lipham
Dr. Richard A. Rossmiller

Project Associate
Dr. Terry G. Geske

Name of School _____

Researcher(s) _____

PROCEDURAL DETAILS

BEFORE ARRIVING AT YOUR SCHOOL:

(1) a. In order that we may group and randomize children for testing purposes, please send me at your earliest convenience a list of the names of the children in unit/team _____, including year and month of birth, sex, and grade level equivalent.

SAMPLE: (1) Jane Aaron 65/3 - F - 5th
(2) Larry Brown 64/3 - M - 6th

Send student list to: R-3 Research Project, Room 571
1025 West Johnson Street
Madison, Wisconsin 53706

b. Please exclude from your list all children who participate in special education programs. They will not be included in this particular study.

c. After we receive your list, we will randomly place the children into 3 testing groups and will then send you the lists of children to facilitate testing arrangements in your school. This list will accompany teacher and principal questionnaire packet.

d. After receiving your list of children (1a.) and after these children have been randomly placed into 3 groups, we will fill in all the information needed on the student answer sheet prior to testing, so that teachers or students need not waste time on this procedure.

(2) The principal and the selected team teachers will receive their instruments prior to our visitation. Complete instructions will be included with the instruments. We will also send simplified directions for administering the math and reading achievement tests, in order that the teachers may review the directions prior to testing.
*A researcher will be administering the self-concept test.

WHILE AT YOUR SCHOOL:

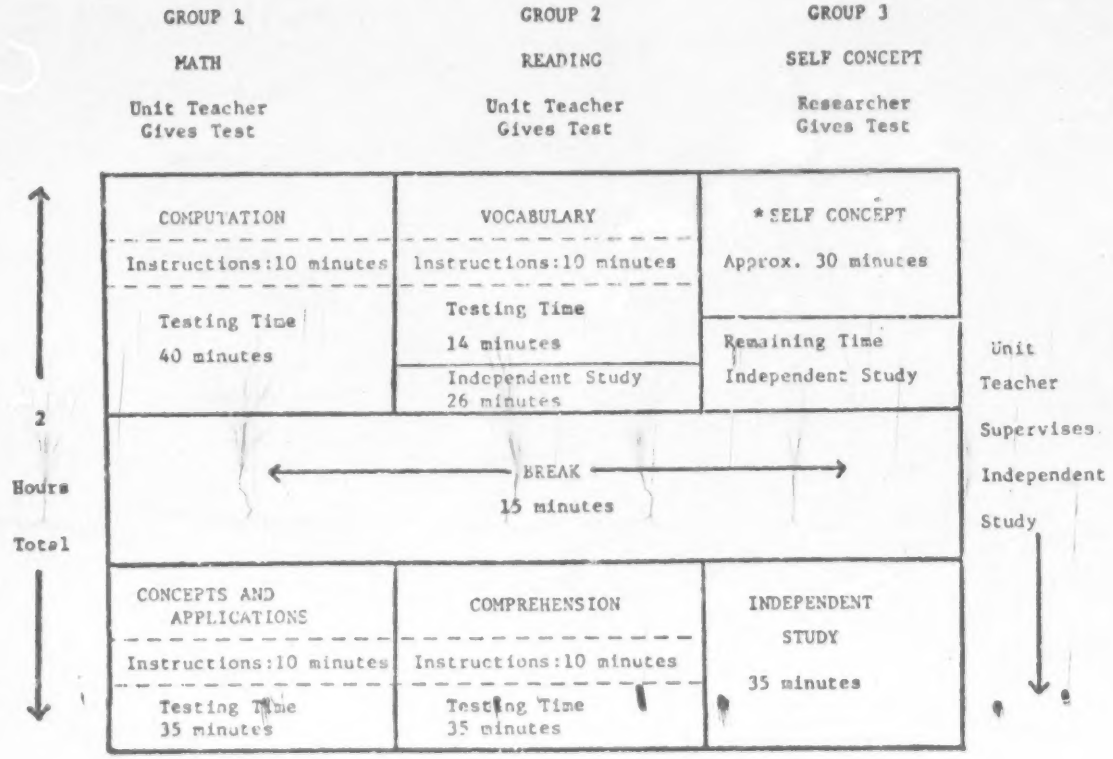
(1) Meeting with Teachers

We would like to arrive at your school in the morning of the day of testing, to meet with the selected team to discuss final arrangements for the testing procedure, and to help in any way possible. This would necessitate a specified meeting time of at least one half hour. We would like to begin testing in the morning whenever possible and finish by 11:00. We would appreciate meeting with the principal from 11:00 until noon.

*Emphasis supplied for this study only

(2) Testing Procedure for Children

We are requesting that children in the selected unit be divided by team members according to the grouping list as indicated in (1d.) above. The testing times of each test are shown in a diagram below. As indicated, each test requires different amounts of time. This will necessitate the need for quiet independent study (i.e., library book, seat work, etc.) for some students when they are not engaged in testing. We would appreciate team teachers preparing these students for this independent study, especially in Group 3, for these children will have a considerable amount of free time.



This grouping arrangement requires that one unit teacher be assigned to Group 1 and one unit teacher to Group 2 to administer the appropriate test to that group. The researcher will be responsible for giving the Self Concept Test, and will serve as overall facilitator of the testing procedure.

An example of a specific time schedule might look like the following:

8:00 - 8:30:		Meeting with Faculty
9:00 - 9:50:	(1)	Math Group takes Computation test.
	(2)	Reading Group takes Vocabulary test and does independent study.
	(3)	*Self Concept Group takes entire test and does independent study.
9:50 -10:10:		BREAK (OUTDOORS) FOR ALL CHILDREN
10:15 -11:00:	(1)	Math Group takes Concepts and Applications test.
	(2)	Reading Group takes Comprehension test.
	(3)	*Self Concept Group engages in independent study.
11:00 - Noon:		Meet with Principal

This time schedule may vary for your school, and we do want to accommodate whatever arrangement that best suits your needs.

the
Wisconsin
Research and Development Center
for Cognitive
Learning

the University of Wisconsin 1025 West Johnson Street Madison, Wisconsin 53706 (608)262-4901

Agenda for Morning Meeting at School

1. (a) Do students know what group they are in?

   (b) Have plans been made for special education students?

   (c) Facilities for the grouping?

   Who will administer the tests?

	Person	Space Designation	Time of Test
1) Math	_____	_____	_____
2) Reading	_____	_____	_____
3) Self-Concept	Researcher	_____	_____

2. Have you made arrangements for individual study? What is your proposed schedule?

3. (a) CTBS

   (b) Check answer sheets for correct grade equivalent, age, sex, level, form. (Students' names will not be used on answer sheets).

4. Teachers, Unit leader, and Principal instruments.

5. New students.

APPENDIX F

CHRONOLOGICAL AGES AT THE TIME OF TESTING
AND CORRESPONDING GRADE EQUIVALENTS

C.A.	Gr.Pl.	C.A.	Gr.Pl.	C.A.	Gr.Pl.	C.A.	Gr.Pl.	C.A.	Gr.Pl.
76	1.0	101	3.0	125	5.0	150	7.0	174	9.0
77	1.1	102	3.1	127	5.1	151	7.1	175	9.1
78	1.2	103	3.2	128	5.2	153	7.2	176	9.2
80	1.3	104	3.3	129	5.3	154	7.3	178	9.3
81	1.4	106	3.4	1 0	5.4	155	7.4	179	9.4
82	1.5	107	3.5	132	5.5	156	7.5	180	9.5
83	1.6	108	3.6	133	5.6	158	7.6	181	9.6
85	1.7	109	3.7	134	5.7	159	7.7	182	9.7
86	1.8	111	3.8	135	5.8	160	7.8	183	9.8
87	1.9	112	3.9	137	5.9	161	7.9	184	9.9
88	2.0	113	4.0	138	6.0	163	8.0	186	10.0
89	2.1	114	4.1	139	6.1	164	8.1	187	10.1
91	2.2	116	4.2	140	6.2	165	8.2	188	10.2
92	2.3	117	4.3	142	6.3	166	8.3	189	10.3
93	2.4	118	4.4	143	6.4	167	8.4	190	10.4
95	2.5	119	4.5	144	6.5	168	8.5	191	10.5
96	2.6	121	4.6	145	6.6	169	8.6	192	10.6
97	2.7	122	4.7	146	6.7	171	8.7	193	10.7
98	2.8	123	4.8	148	6.8	172	8.8	195	10.8
99	2.9	124	4.9	149	6.9	173	8.9	196	10.9

Based upon:

E. Sullivan, W. Clark, E. Tiegs, Examiners Manual, California Short Form-Test of Mental Maturity, Level 5 (Monterey: California Test Bureau, Division of McGraw-Hill Company, 1963).

EXPANDED STANDARD SCORE (SCALE SCORE) TO GRADE EQUIVALENT FORM S*

Scale Scores

GE	Reading			Mathematics			
	Vocab	Compr	Total	Comp	Cncpt	Appl	Total
3.5	366-369	389-393	368-372	349-354	372-375	363-367	351-355
3.6	370-374	394-398	373-377	355-360	376-379	368-372	356-360
3.7	375-379	399-403	378-381	361-365	380-383	373-377	361-365
3.8	380-383	404-408	382-386	366-368	384-387	378-381	366-368
3.9	384-387	409-412	387-390	369-371	388-391	382-386	369-372
4.0	388-391	413-417	391-395	372-374	392-395	387-390	373-375
4.1	392-395	418-421	396-399	375-377	396-398	391-394	376-378
4.2	396-399	422-425	400-404	378-380	399-401	395-398	379-381
4.3	400-403	426-429	404-408	381-382	402-405	399-402	382-384
4.4	404-406	430-433	409-412	383-384	406-408	403-406	385-387
4.5	407-409	434-437	413-416	385-387	409-411	407-410	388-390
4.6	410-413	438-440	417-419	388-391	412-414	411-414	391-393
4.7	414-419	441-444	420-423	392-396	415-417	415-417	394-396
4.8	420-424	445-447	424-426	397-401	418-420	418-421	397-400
4.9	425-428	448-450	427-429	402-405	421-423	422-424	401-405
5.0	429-432	451-453	430-432	406-411	424-426	425-428	406-410
5.1	433-436	454-456	433-436	412-416	427-429	429-431	411-413
5.2	437-440	457-460	437-440	417-421	430-432	432-435	414-417
5.3	441-445	461-464	441-443	422-424	433-434	436-438	418-421
5.4	446-449	465-468	444-447	425-427	435-437	439-441	422-426
5.5	450-452	469-471	448-450	428-430	438-440	442-444	427-430
5.6	453-455	472-475	451-454	431-433	441-442	445-447	431-433
5.7	456-458	476-478	455-459	434-437	443-445	448-450	434-437
5.8	459-461	479-480	460-461	438-440	446-448	451-453	438-440
5.9	462-465	481-483	462-465	441-443	449-450	454-456	441-443
6.0	466-469	484-487	466-469	444-445	451-453	457-459	444-447
6.1	467-469	488-490	470-472	446-447	454-456	460-462	448-450
6.2	470-472	491-492	473-475	448-450	457-458	463-465	451-452
6.3	473-475	493-494	476-478	451-452	459-461	466-468	453-455
6.4	476-479	495-496	479-481	453-455	462-464	469-471	456-458
6.5	480-482	-497	482-483	456-456	465-466	472-474	459-460
6.6	483-485	-498	484-485	457-461	467-469	475-477	461-463
6.7	486-489	499-500	486-487	462-464	470-472	478-479	464-467
6.8	490-492	501-502	488-490	465-467	473-475	480-482	468-471
6.9	493-495	503-504	491-493	468-469	476-477	483-485	472-474
7.0	496-498	505-507	494-496	470-471	478-480	486-488	475-477
7.1	499-502	508-509	497-498	472-474	481-483	489-491	478-480
7.2	503-505	510-511	499-501	475-477	484-486	492-493	481-482
7.3	506-508	512-514	502-504	478-480	487-489	494-496	483-484
7.4	509-511	515-516	505-507	481-482	490-492	497-499	485-486
7.5	512-515	517-519	508-510	483-484	493-495	500-502	487-488

Note: Data in this table are taken from: California Test Bureau, Examiner's Manual, Comprehensive Test of Basic Skills, Form S, Table 15, p. 72, McGraw Hill.

STANDARD DEVIATIONS OF MEAN SCALE SCORES FOR THE STANDARDIZATION SAMPLE BY TEST AND BY TOTAL: COMPREHENSIVE TEST OF BASIC SKILLS, LEVEL 11*

TEST OR TOTAL	GRADE									
	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
Reading Vocab.	70.43	70.94	71.45	71.96	72.47	72.98	73.49	74.0	74.78	75.56
Reading Compre.	84.78	85.44	86.1	86.76	87.42	88.08	88.74	89.4	89.94	90.48
TOTAL READING	73.2	74.0	74.8	75.6	76.4	77.2	78.0	78.8	79.41	80.02
Math. Comput.	49.0	49.5	50.0	50.5	51.0	51.5	52.0	52.5	53.72	54.94
Math. Concepts	71.95	72.6	73.25	73.9	74.55	75.2	75.85	76.5	77.11	77.72
Math. Applic.	76.15	76.8	77.45	78.1	78.75	79.4	80.05	80.7	81.32	81.94
TOTAL MATH.	56.32	56.86	57.4	57.94	58.48	59.02	59.56	60.1	61.03	61.96
	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
Reading Vocab.	76.34	77.12	77.9	78.68	79.46	80.24	81.02	81.8	82.7	83.6
Reading Compre.	91.02	91.56	92.1	92.64	93.18	93.72	94.26	94.8	95.6	96.4
TOTAL READING	80.63	81.24	81.85	82.46	83.07	83.68	84.28	84.9	85.73	86.56
Math. Comput.	56.16	57.38	58.6	59.82	61.04	62.26	63.48	64.7	65.64	66.58
Math. Concepts	78.33	78.94	79.55	80.16	80.77	81.38	81.99	82.6	83.27	83.94
Math. Applic.	82.56	83.18	83.8	84.42	85.04	85.66	86.28	86.9	87.42	87.94
TOTAL MATH.	62.89	63.82	64.75	65.68	66.61	67.54	68.47	69.4	70.54	71.68
	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
Reading Vocab.	84.5	85.4	86.3	87.2	88.1	89.0	89.90	90.8	91.82	92.84
Reading Compre.	97.2	98.0	98.8	99.6	100.4	101.2	102	102.8	103.6	104.4
TOTAL READING	87.39	88.22	89.05	89.88	90.71	91.54	92.37	93.2	93.88	94.56
Math. Comput.	67.52	68.46	69.4	70.34	71.28	72.22	73.16	74.1	74.98	75.86
Math. Concepts	84.61	85.28	85.95	86.62	87.29	87.96	88.63	89.3	90.21	91.12
Math. Applic.	88.46	88.98	89.5	90.02	90.54	91.06	91.58	92.1	93.01	93.92
TOTAL MATH.	72.82	73.96	75.1	76.24	77.38	78.52	79.66	80.8	81.56	82.32

Developed from Tables 31, 32, 33, pages 35, 36 - Technical Bulletin No. 1 Comprehensive Tests of Basic Skills Form S (Monterey: CTB/McGraw-Hill, 1974)

APPENDIX G

VOCABULARY Z SCORE OF ONE SCHOOL BASED UPON GROSS UNIT, WEIGHTED GRADE, AND INDIVIDUAL STUDENT DATA

School No: 196754

Gross Unit Data

Mean Age in Months	Unit Scale Score	Mean Scale Score	Standard Deviation	Mean Z Score for Student
129.72	457.6	444	79.242	.1716

Grade Data

Mean Age in Months	Number of Cases	Grade Scale Score	Mean Scale Score	Standard Deviation	Mean Z Score for Student
120	21	420	408.5	73.235	.1590
130	12	475	447.5	79.460	.3461
143	15	496	477.5	88.100	.2100

Z Score By Weighted Grade

$$\frac{(.1590 \times 21) + (.3461 \times 12) + (.2100 \times 15)}{48} = .2217$$

Individual Student Data

Age in Months	Actual Scale Score	Mean Scale Score	Standard Deviation	Z Score	Age in Months	Actual Scale Score	Mean Scale Score	Standard Deviation	Z Score
122	557	416.5	74.00	1.8986	126	490	431.0	76.73	.7689
122	490	416.5	74.00	.9932	136	490	460.5	83.15	.3548
113	498	389.5	70.43	1.5405	135	461	460.	82.70	.0121
119	482	408.0	72.98	1.0140	122	447	416.5	74.00	.4122
122	516	416.5	74.00	1.3446	132	419	451.0	80.24	-.3988
120	447	408.5	73.24	.5257	137	419	462.5	83.60	-.5203
113	475	389.5	70.43	1.2140	126	468	431.0	76.73	.4822
126	447	431.0	76.73	.2085	127	405	434.5	77.12	-.3825
119	440	408.0	72.98	.4385	126	397	431.0	76.73	-.4431
115	447	394.0	71.20	.7444	143	673	477.5	88.10	2.2191
123	440	422.0	74.78	.2407	144	577	481.0	89.00	1.0787
125	412	430.5	76.34	-.2423	139	577	468.0	85.40	1.2763
121	345	411.5	73.49	-.9049	141	601	471.5	86.75	1.4928
113	405	389.5	70.43	.2201	139	528	468.0	85.40	.7026
123	419	422.0	74.78	-.0401	142	490	474.0	87.20	-.1835
126	405	431.0	76.73	-.3389	142	507	474.0	87.20	.3784
117	390	401.5	71.96	-.1598	137	498	462.5	83.60	.4246
116	345	397.5	71.45	-.7348	147	461	488.0	91.31	-.2957
122	355	416.5	74.00	-.8511	139	433	468.0	85.40	-.4098
117	266	401.5	71.96	-1.9830	148	419	491.0	91.82	-.7841
119	249	408.0	72.98	-2.1787	150	405	497.0	93.86	-.9802
126	633	431.0	76.73	2.6326	142	426	474.0	87.20	-.5505
134	577	457.0	81.80	1.4670	146	419	487.5	90.80	-.7544
129	490	443.0	78.68	.5974	142	476	474.0	87.20	-.3505

Total of Scores = 11.4825

Total Number of Students = 48

11.4825 ÷ 48 = .2392

Mean score for student = .2392

APPENDIX H

SCALE SCORE MEANS AND STANDARD DEVIATIONS FOR THE STANDARDIZATION SAMPLE OF CTBS/S IN SELECTED GRADE LEVELS IN READING DESCRIBING THE NON-LINEARITY BETWEEN GRADE LEVELS*

Scale Scores

Grade Level	4.7		5.7		6.7
TEST	Actual Score	Differences Between Grades	Actual Score	Differences Between Grades	Actual Score
VOCABULARY	414	42	456	31	487
COMPREHENSION	443	34	477	22	499
TOTAL READING	422	37	459	26	485

Standard Deviations

Grade Level	4.7		5.7		6.7
TEST	Actual SD	Differences Between Grades	Actual SD	Differences Between Grades	Actual SD
VOCABULARY	74.0	7.8	81.8	9	90.8
COMPREHENSION	89.4	5.4	94.8	8	102.8
TOTAL READING	78.8	6.1	84.9	8.3	93.2

Note: Developed from California Test Bureau, Technical Bulletin No. 1, Comprehensive Test of Basic Skills, Form S, Table 31, p. 36, 1974, McGraw-Hill.

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